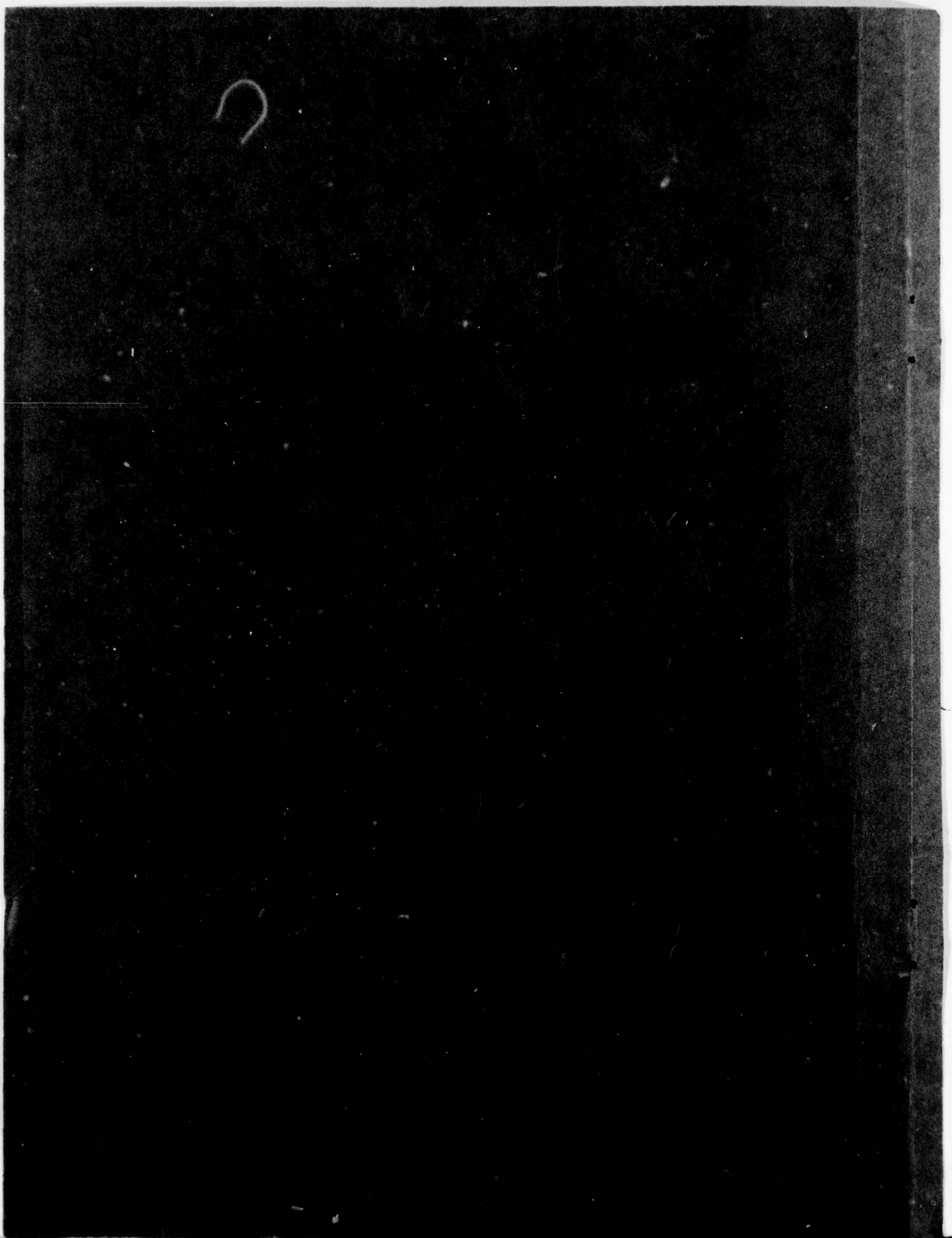
AD-A052 767 HARRY DIAMOND LABS ADELPHI MD F/G 9/2
SKYNET APPLICATIONS SOFTWARE PACKAGE (SASP) PROGRAMMERS' HANDBO--ETC(U)
FEB 78 R PUTTCAMP
UNCLASSIFIED HDL-TR-1844 NL

1 OF 2
AD A052767



UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER (14) HDL-TR-1844	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* (6) SKYNET Applications Software Package (SASP) Programmers' Handbook, Version 2		5. TYPE OF REPORT & PERIOD COVERED (9) Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) (10) Robert Puttcamp		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Harry Diamond Laboratories 2800 Powder Mill Road Adelphi, MD 20783		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Program Ele: 6.27.04.H
11. CONTROLLING OFFICE NAME AND ADDRESS Director Defense Nuclear Agency Washington, DC 20305		12. REPORT DATE (11) February 1978 13. NUMBER OF PAGES 131 (12) 127p.
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)* (16) R99QAXE (17) E502		15. SECURITY CLASS. *(of this report)* UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

HDL Project: 284724
DRCMS Code: 36AA.7100.62704
This research was sponsored by the Defense Nuclear Agency under subtask R99QAXEE502, Systems Generated EMP Work Unit 06, SKYNET.

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

SKYNET
SGEMP
Data acquisition software
Minicomputer applications software

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The assessment of satellite vulnerability to system generated electromagnetic pulses (SGEMP) and the development of a methodology for this assessment are the prime objectives of the Defense Nuclear Agency sponsored SKYNET program. An automated procedure for this has resulted in the assembling of the SGEMP

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

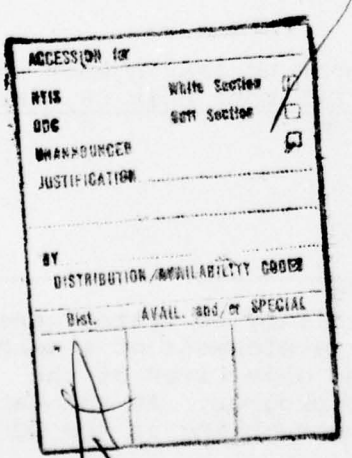
UNCLASSIFIED

1 SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

163 050 JOB

Transportable Automated Recording System (STARS) data van. The STARS is controlled by a PDP 11/40 computer using the SASP as its software implementation.

This report gives a detailed description of each program and subroutine used in the SASP, excluding descriptions of purchased graphic software (Tektronix Plot-10 package and Versaplot package). It is intended to provide the programmer with the information required to effectively utilize the system.



CONTENTS

Page

1. INTRODUCTION 7

2. INDIVIDUAL PROGRAM DOCUMENTATION 7

ATN 9
BASE 11
BLKCNT 12
BLMCHK 12
CAL 13
CHKBAS 13
CHKCAL 14
CLEAR 16
CONDAT 16
CONGEN 18
DATAPC 18
ERASE 20
FIXNPT 21
FLAG 22
FPLOT 23
GETCON 23
KNOB 24
LOG 24
MARK 25
MORDAT 28
OFFLIN 29
OUTFIL 29
PLOTC 30
PLTCLR 30
PRB 31
PREDAT 31
PRTNAM 32
RAWCPY 32
RECCAL 35
SAVCON 36
SCACPY 36
SCALE 38
SCAVP 40
SETFLG 41
SHOTNO 42
SNAPIT 43
SUMERR 43
SYSCHK 44
SYSDMP 44
TABIN 45

CONTENTS (Cont'd)

		Page
	TABLES	46
	USRCOM	49
	VCOPY	49
	XCH	51
3.	INDIVIDUAL SUBROUTINE DOCUMENTATION	53
	ABSPKV	54
	ANOCLR	54
	ANOMRK	55
	ANOSCA	55
	ANOT8	56
	ANSWER	56
	ASCBIN	57
	ASDCD	57
	ASTSC	58
	ATNREF	59
	ATNSCH	60
	ATTEN	60
	BASATC	61
	BUSY	62
	CALATC	62
	CALCSF	62
	CALIB	63
	CALOR	64
	CALPLT	64
	CHACNT	65
	CHKTRG	65
	CHNERR	66
	CLRCBD	66
	CMDDIG	67
	DATATC	68
	DATFIO	68
	DCDBIT	70
	DIGERR	71
	DISABL	71
	DSKERR	72
	ELIMPT	73
	ERRNUM	73
	EXTRAP	73
	FIELD	74
	FLDCD	75
	FLGPTS	75
	FLOTE	76
	FLPOP	76

CONTENTS (Cont'd)

	Page
FSCIN	77
FXDCD	77
GETBAS	78
GETCAL	79
GETDAT	79
GRAATC	80
GRABAS	80
GRACAL	81
GRAPHV	82
GRARAW	82
GRASCA	83
GRAT	85
IASCII	86
IFICKS	86
INITLZ	87
INPCSR	87
INPUT	88
INT	88
INTABL	89
INTDIG	90
INTRP	90
ISBASE	91
LSTERR	91
MARKIT	92
MINMAX	92
MRKCUR	93
NSCALE	94
PAGE	94
PLTSF	95
PRBREF	95
PRBSCH	96
PRICLR	97
QKELIM	98
QKLNTP	98
RAWPLT	99
RDIG	99
RDUKRO	104
SAVCLR	104
SCADAT	105
SCGEN	106
SCIO	106
SCMAIN	107
SETVEC	108
STCDAT	108

CONTENTS (Cont'd)

	Page
SUBASE	109
UCOUT	109
VGRAT	110
XCHDRI	110
XCHREF	110
XCHSCH	112
XMIT	112
.RSTR	114
.SAVE	114
DISTRIBUTION	129

APPENDICES

A.--SUBROUTINE CROSS-REFERENCE LIST	115
B.--STANDARDIZED COMMON AREAS	123
C. REMARKS ON SYSCON	127

1. INTRODUCTION

This manual is a revision of the programmer's handbook[1] by the same name, written by Walter J. Scott and John R. Hiller of the Harry Diamond Laboratories. It incorporates those changes and additions to the SKYNET Applications Software Package (SASP) which have been made since August 1976.

This Programmers' Handbook contains detailed descriptions of the programs and subroutines which comprise the SASP used in the Systems Generated Electromagnetic Pulse (SGEMP) Transportable Automated Recording System (STARS). These programs, which run on the Digital Equipment Corporation (DEC) Programmable Data Processor (PDP) 11/40 computer, control the acquisition, storage, reduction and presentation of all data collected within the STARS trailer. Details concerning the operation of STARS are given[2] in the SASP Operators' Handbook, Version 2.

2. INDIVIDUAL PROGRAM DOCUMENTATION

The following standard entries have been used to document the SASP program.

Entry	Definition
Program Name	The full name of the program.
Task Name	The name given to the program by the operating system task builder
Language	The programming language in which the program is written
Written	The date that the program was written
Modified	The date or dates that the program was modified
Called Subroutines	A list of those subroutines called directly by the program (Entry points, if different from the subroutine name, are shown in parentheses.)

---

[1] *Walter J. Scott and John R. Hiller, SKYNET Applications Software Package (SASP) Programmer's Handbook, Harry Diamond Laboratories TR-1828 (November 1977).*

[2] *Walter J. Scott, John R. Hiller, and Robert Puttcamp, SKYNET Applications Software Package (SASP) Operators' and Users' Handbook, Version 2, Harry Diamond Laboratories TR-1843 (March 1978).*

Entry	Definition
Files	Disc files referenced by the program
Input/Output (I/O) Devices	Peripheral devices, other than disc, used by the program
COMMON Areas	Names of COMMON blocks used by the program
Description	A general narrative description of what the program does
Algorithms	A description of any significant algorithms used by the program
Flowchart	A flowchart of the program
Typical Output	A sample of the output from the program

These entries are used only if they are directly applicable to the program under discussion.

The following is a list of standard peripheral device abbreviations.

CR: or CR0:	The card reader
CT: or CT0:	Drive 0 of the cassette reader
CT1:	Drive 1 of the cassette reader
DK: or DK0:	Disc drive 0
DK1:	Disc drive 1
LP: or LP0:	The line printer
MT: or MT0:	The magnetic tape drive
TI:	The terminal from which the program is being run
TT: or TT0:	The Tektronix R4010 cathode ray tube terminal.
TT1:	The DECwriter II (LA36) terminal.

The remainder of this section lists the individual program documentation.

ATN ATN

FORTRAN Written May 1976
Modified March 1977

Called Subroutines:

ANSWER, ASDCD, ATNREF, AINIT, ANEW, ARDENT, ARDNEX, ARESET, AWRADD, AWRENT, FLDCD, INPUT

File:

DK0:[100,100]ATNCAL.DAT

I/O Devices:

TI:, LP:

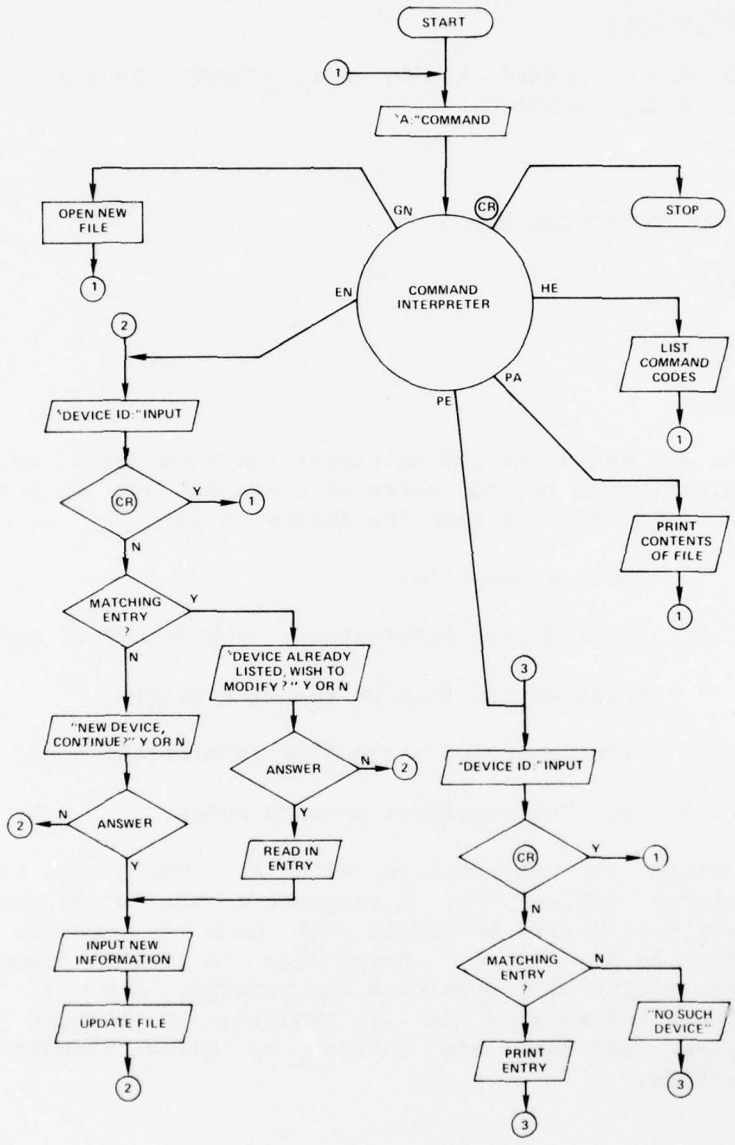
Description:

Program ATN generates and maintains the attenuator calibration file ATNCAL.DAT. The various modes of operation are selected by issuing the required commands from the following list:

GN	Start a new file.
EN	Enter device information: either new or updated data.
PA	Print entire file on the line printer.
PE	Print selected attenuator information on TI:.
HE[LP]	List the available command codes.

ATN prompts for information with A:; modes GN, EN, and PE also prompt with DEVICE ID:. A response to the latter prompt of only a carriage return will terminate that mode of operation and cause the A: prompt to be issued. Responding to the A: prompt with just a carriage return will terminate the program. ATN will request such additional information as it requires to perform the requested functions. All data are entered by using standard SASP input conventions.

Flowchart: ATN



BASE BAS

MACRO-11 Written April 1976
Modified November 1976

Called Subroutines:

ATTEN(TRIGB), CHKTRG, CLRCBD, CMDDIG, DSKERR, GETBAS, INTABL

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TI:, digitizers, attenuator control unit, trigger control unit

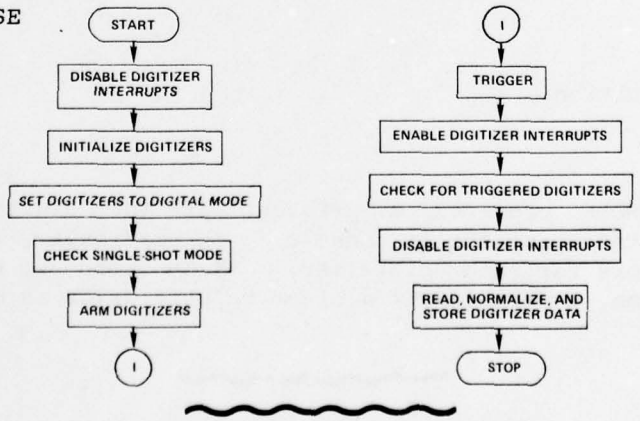
COMMON Area:

SYSCON partition

Description:

Program BASE acquires, reduces and stores a baseline trace for each enabled digitizer. Triggering of the digitizers is accomplished automatically. The raw baseline trace is normalized and stored in integer mode and the trace bloom is calculated and stored in SYSCON. The digitizer knob readouts are compared with the requested settings and any errors found are noted. Any error condition past or present on either a digitizer or its associated channel will result in the generation of a no baseline (NOB) error for that digitizer. If the initial error occurs after the raw data have been normalized, the baseline trace will be stored.

Flowchart: BASE



BLKCNT BLK

FORTRAN Written May 1976
Modified January 1977

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program BLKCNT prints the number of disc blocks required for file MAIN.DAT. This value is stored in SYSCON and in file SYSCON.DAT by program CONGEN.

BLMCHK BLM

FORTRAN Written August 1976
Modified January 1977

Called Subroutine:

PAGE

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program BLMCHK provides a printout of the digitizer entries in SYSCON on the operator's console. In particular, it provides the bloom factors for each digitizer. These need to be checked from time to time, especially if a bloom related error is generated.

CAL CAL

MACRO-11 Written April 1976
Modified October 1976, January and March 1977

Called Subroutines:

CALIB, CHKTRG, CLRCBD, CMDDIG, DSKERR, GETCAL, INTABL, SETVEC

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TI:, digitizers, attenuator control unit, trigger control unit

COMMON Area:

SYSCON partition

Description:

Program CAL acquires, reduces and stores a calibration trace for each enabled digitizer. Triggering is accomplished automatically. The digitizer knob readouts are compared with the required settings and any errors are noted. Any error past or present on a digitizer or its associated channel will cause a no calibration data (NOC) error to be generated.

The transmitters are turned on and allowed to warm up for the number of seconds specified by the value of variable CNTXMT contained in the SYMDEF macro. There is an additional 3-s delay between calibration triggering and the automatic turnoff of the transmitters.

CHKBAS CKB

FORTRAN Written July 1976
Modified October 1976, January 1977

Called Subroutines:

ANSWER, DATFIO (OPENS, READB, CLOSES), GRABAS, TCS

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TT0:, LP0:

COMMON Areas:

BASDAT, SYSCON partition

Description:

Program CHKBAS plots the baseline data on the Tektronix R4010 terminal. The program asks the operator if hard copies of these graphs are desired. A "Y" response will cause the automatic generation of these hard copies on the line printer (LP:); any other response will cause this section of the program to be skipped. After each graph is drawn, the operator is asked the question "CONTINUE?" A "Y" response will cause the program to plot the output from the next enabled digitizer; any other response will cause the program to terminate. CHKBAS is checkpointable and will exit while waiting for a response to the question to the operator if another program is running in or requesting the same partition.

CHKCAL CKC

FORTRAN Written May 1976
Modified October 1976, January and March 1977

Called Subroutines:

ANSWER, CHNERR, DATFIO (OPENS, READB, CLOSES), GRACAL, XCHDRI, TCS

Files:

DK0:[100,100]XCHCAL.DAT, DK1:[100,100]MAIN.DAT

I/O Devices:

TT0:, LP0:

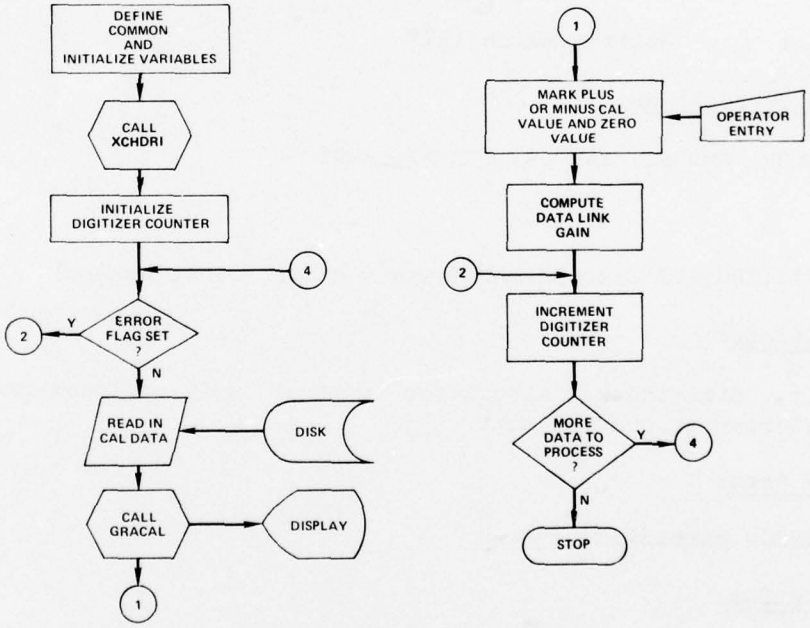
COMMON Areas:

SYSCON partition, XCHCAL, CALDAT

Description:

Program CHKCAL is used to evaluate the calibration data from each enabled digitizer. The program begins by asking the operator if hard copies of the calibration graphs are desired. A "Y" answer to this question will cause hard copies to be produced automatically; any other answer will cause this section of the program to be skipped. Each calibration pulse is plotted on the Tektronix R4010 terminal and the operator is asked to mark either the positive or the negative peak value of the calibration pulse and the zero value by using the Y-cursor of the terminal. These values are stored in SYSCON. The channel subsystem gain (the gain from the input of the optical transmitter through the digitizer) is calculated and stored in SYSCON. Two additional lines are drawn on the graph to show the values that the operator picked.

Flowchart: CHKCAL



CLEAR CLE

FORTRAN Written January 1977

File:

DK0:[100,100]FLAG.DAT

COMMON Area:

SYSCON partition

Description:

Program CLEAR reads the digitizer and channel flag information from file FLAG.DAT and resets these words in COMMON partition SYSCON. Program CLEAR sets event flag 34 upon its completion.

CONDAT CON

MACRO-11 Written March 1977

Called Subroutines:

CALOR, CMDDIG, SAVCLR, STCDAT, XMIT

File:

DK1:[100,100]Cssss02.DAT (ssss = current shot number)

I/O Devices:

TI:, digitizers, attenuator control unit, trigger control unit, calorimeter control unit

COMMON Area:

SYSCON partition

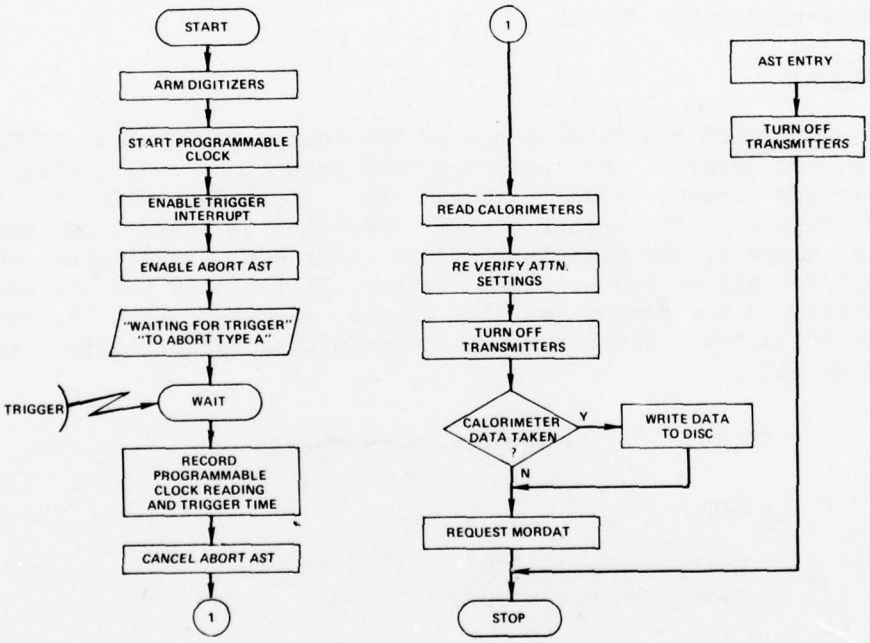
Description:

Program CONDAT continues the data-taking process. The digitizer sweeps are armed. The messages "CONDAT RUNNING" and "WAITING FOR TRIGGER" are displayed on TI:. The shot trigger interrupt is enabled. A message "TO ABORT TYPE A" is displayed and an I/O request to the terminal with an asynchronous trap (AST) address exit

point is issued. At this point, CONDAT goes into a wait loop for the trigger from the simulator. On receiving the trigger, the shot time is stored in SYSCON, the AST is cancelled, and the calorimeter data are collected. The attenuator settings are then reverified and the transmitters are turned off. If there are data from the calorimeters, they are written to DK1: and then to LP0:. CONDAT then requests MORDAT and exits.

In the event that the simulator does not fire or if for any other reason the operator wishes to abort the run, he types the letter "A." This is picked up by the AST, the transmitters are turned off, the interrupts are disabled, and CONDAT exits without requesting program MORDAT.

Flowchart: CONDAT



CONGEN GEN

FORTRAN Written May 1976
Modified January and March 1977

Called Subroutines:

FXDCD, INPUT, SCGEN, SCIO(SCOUT), DSKERR, XCHSCH

Files:

DK0:[100,100]SYSCON.DAT, DK0:[100,100]XCHCAL.DAT

I/O Device:

TI:

COMMON Areas:

SYSCON partition, XCHCAL

Description:

Program CONGEN generates a new system configuration file SYSCON.DAT; zeros and resets the SYSCON COMMON partition and initializes the following items: the number of digitizers in the system configuration, the number of digitizer control boards, the number of data channels, the digitizer UNIBUS addresses (utilizing operator input for all of the preceding items); calculates the virtual block numbers and the number of disc blocks required for the shot data file (MAIN.DAT); and locates the transmitter numbers (from the file XCHCAL.DAT).

DATAPC DAT

MACRO-11 Written April 1976
Rewritten March 1977

Called Subroutines:

ATTN, CLRCBD, CMDDIG, INTABL, SETVEC, XMIT

I/O Devices:

TI:, digitizers, attenuator control unit

COMMON Area:

SYSCON partition

Description:

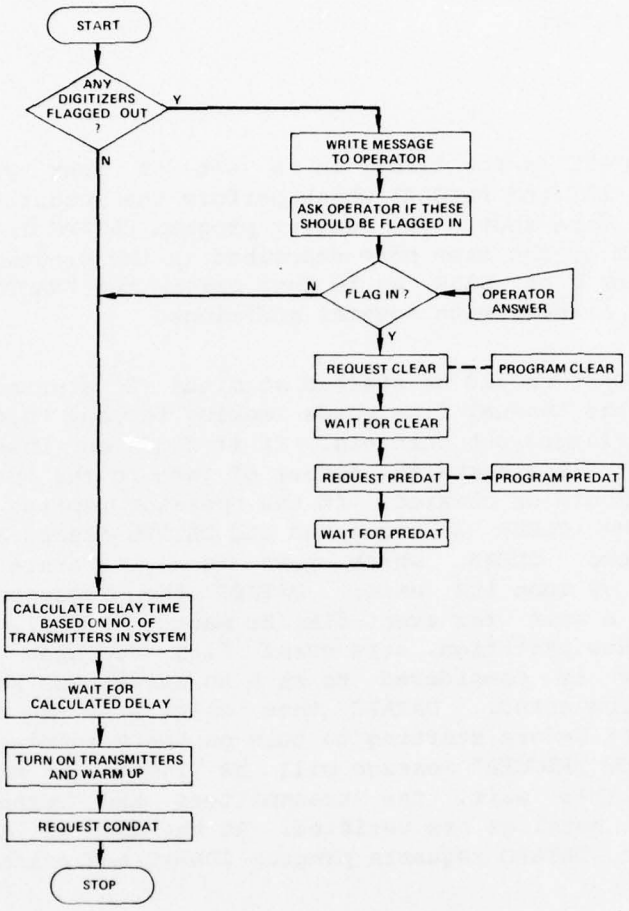
Program DATAPC is the first in a set of four programs (DATAPC, CONDAT, MORDAT and PLTCLR) which perform the required functions for an actual data shot. The current program DATAPC is that portion of the program by the same name described in the programmer's handbook[1] for Version 1 of SASP up to just before the "WAITING FOR TRIGGER" message is issued, with several additions.

Program DATAPC should be started at minus 2 minutes. The program searches the channel flag words looking for any that are nonzero, i.e., for flagged out channels. If it finds any channels that are flagged out, it reports the number of them to the operator and asks if they should be cleared. If the operator replies with a "Y" for yes, program CLEAR is requested and DATAPC issues a wait for event flag 34 macro. CLEAR, which runs in a separate partition, sets event flag 34 upon its exit. DATAPC then requests program PREDAT and issues a wait for event flag 35 macro. PREDAT, which also runs in a separate partition, sets event flag 35 upon its exit. Any other reply is considered to be a no answer and neither CLEAR nor PREDAT is requested. DATAPC then calculates the proper amount of time to wait before starting to turn on the transmitters so that the "WAITING FOR TRIGGER" message will be issued at minus 20 seconds. Following this wait, the transmitters are turned on and the attenuator settings are verified. At the end of the transmitter warmup time, DATAPC requests program CONDAT and exits.

---

[1] *Walter J. Scott and John R. Hiller, SKYNET Applications Software Package (SASP) Programmer's Handbook, Harry Diamond Laboratories TR-1828 (November 1977).*

Flowchart: DATAPC



ERASE ERA

FORTRAN Written May 1976

Called Subroutine:

PAGE

File:

TI:

I/O Device:

TI:

Description:

Program ERASE clears the screen of the Tektronix R4010 terminal (TT0:) or issues eight line-feed commands to the DECwriter II (TT1:), depending on which of these is TI:.

FIXNPT FNP

FORTRAN Written August 1976

Called Subroutines:

DATFIO (OPENS, READB, WRITER, CLOSES)

File:

DK1:[100,100]MAIN.DAT

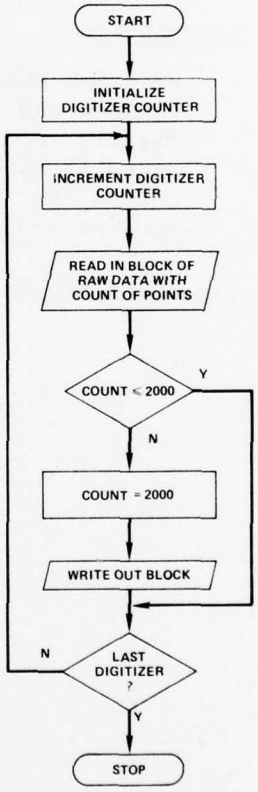
COMMON Area:

SYSCON partition

Description:

Program FIXNPT provides a partial recovery from a data overflow condition on a digitizer (error code OVF). The count of the raw data points for all digitizers is set to the minimum of either the current count or 2000.

Flowchart: FIXNPT



FLAG FLA

FORTRAN Written May 1976

Called Subroutines:

ANSWER, CHNERR, DCDBIT, DIGERR, PAGE

I/O Device:

TI:

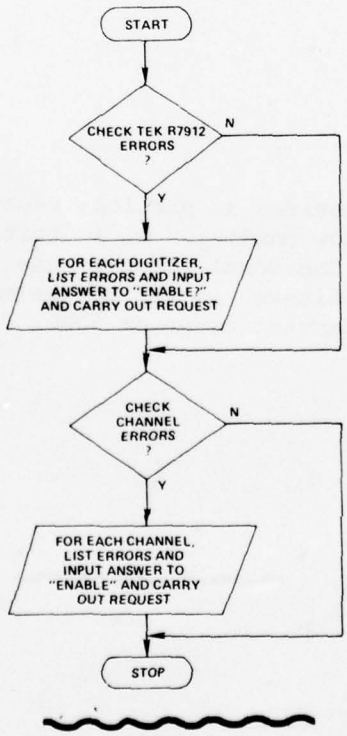
COMMON Area:

SYSCON partition

Description:

Program FLAG prints the error flags present on each digitizer and channel and allows the operator to enable (clear the flags) or disable (add the disabled flag) each such flag word. The question asked of the operator is "ENABLE?" Answering with a "Y" for yes causes the flag word to be cleared; any other answer is interpreted as a no and causes the disabled bit to be set in that flag word.

Flowchart: FLAG



FPLOT FPL

FORTRAN Written by Versatec Corporation
Modified January 1977

File:

DK1:[100,100]VDATA.BIN

I/O Devices:

TI:, LP:

Description:

Program FPLOT uses file VDATA.BIN to produce the final scaled plots on the Versatec line printer. The program queries the operator to obtain the number of copies of each plot.

GETCON GET

MACRO-11 Written January 1977

Called Subroutine:

SCIO (SCIN)

File:

DK0:[100,100]SYSCON.DAT

COMMON Area:

SYSCON partition

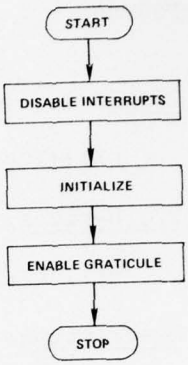
Description:

Program GETCON copies file SYSCON.DAT into the SYSCON COMMON partition. Program GETCON must be run before any data are taken. The only exception to this run is if a new system generation using program CONGEN is done. Program GETCON is run automatically if indirect command file DATAOP is invoked to install the SASP system.

KNOB KNO

MACRO-11 Written April 1976
Modified October 1976, January 1977

Flowchart: KNOB



Called Subroutines:

CLRCBD, CMDDIG

I/O Devices:

TI:, digitizers

COMMON Area:

SYSCON partition

Description:

Program KNOB places all enabled digitizers in knob setting mode. The interrupts are disabled, the digitizers are initialized and switched to the television mode and their dot graticules are enabled. Standard SASP error codes apply.

LOG LOG

FORTRAN Written May 1976
Modified January and March 1977

Called Subroutines:

ANSWER, ASDCD, FLDCD, FXDCD, INPUT, PAGE, SCIO(SCOUT)

File:

DKO:[100,100]SYSCON.DAT

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program LOG is run to add or change the information on the probe, transmitter, receiver and digitizer logs. The choice of skipping and, hence, not changing one or more of these logs is provided. Standard SASP terminal input conventions apply. Items are not checked for validity in program LOG, but may be checked by running program SYSCHK.

Sample log forms and typical input are shown[2] in SASP Operators' and Users' Handbook, Version 2.

The baseline offset position (an item in the digitizer log) is not fully implemented in Version 2 of the SASP. Only a value of zero will work correctly. The SYSCON.DAT file is updated as the final step of program LOG.

MARK MAR

FORTRAN Written May 1976
Modified August and October 1976, January 1977

Called Subroutines:

ANMODE, ANOMRR, ANSWER, ASDCD, DATFIO (OPENS, READB, READR, WRITER, CLOSES), GRAATC, INPCSR, MOVABS, MRKCUR

Files:

DK0:[100,100]XCHCAL.DAT, DK1:[100,100]MAIN.DAT

I/O Devices:

TT0:, LP0:

COMMON Areas:

SYSCON partition, NORDAT, PARAM, XCHHDR

Description:

Program MARK is run to allow the operator to manually mark the time of the peak of the fiducial (fidu) pulse, the time of the start of

[2] *Walter J. Scott, John R. Hiller, and Robert Puttcamp, SKYNET Applications Software Package (SASP) Operators' and Users' Handbook, Version 2, Harry Diamond Laboratories TR-1843 (March 1978).*

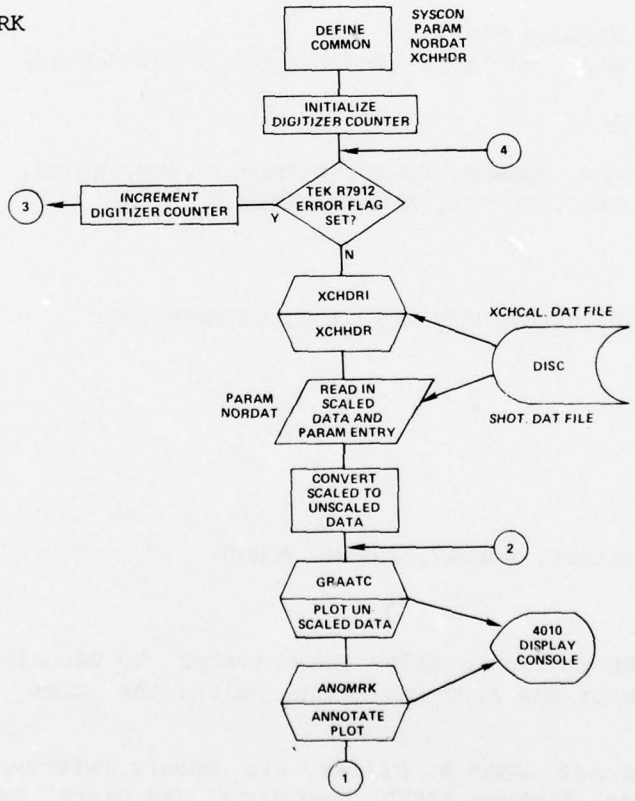
data and the time of the first peak of interest. The scaled data which are read from disc file MAIN.DAT are unscaled and plotted on the Tektronix R4010 terminal for each enabled digitizer. The operator then marks the required points using the graphic X-cursor. The program draws tick marks along the top of the graph to show the marked times and then queries the operator to ascertain whether he is satisfied with the chosen points. An "N" answer causes the program to recycle, redraw the graph, and again allow the operator to mark the required points. A "Y" answer causes the selected times to be stored in COMMON PARAM.

Hard copies of the marked data may be requested by the operator at the start of the program and will be produced automatically if requested.

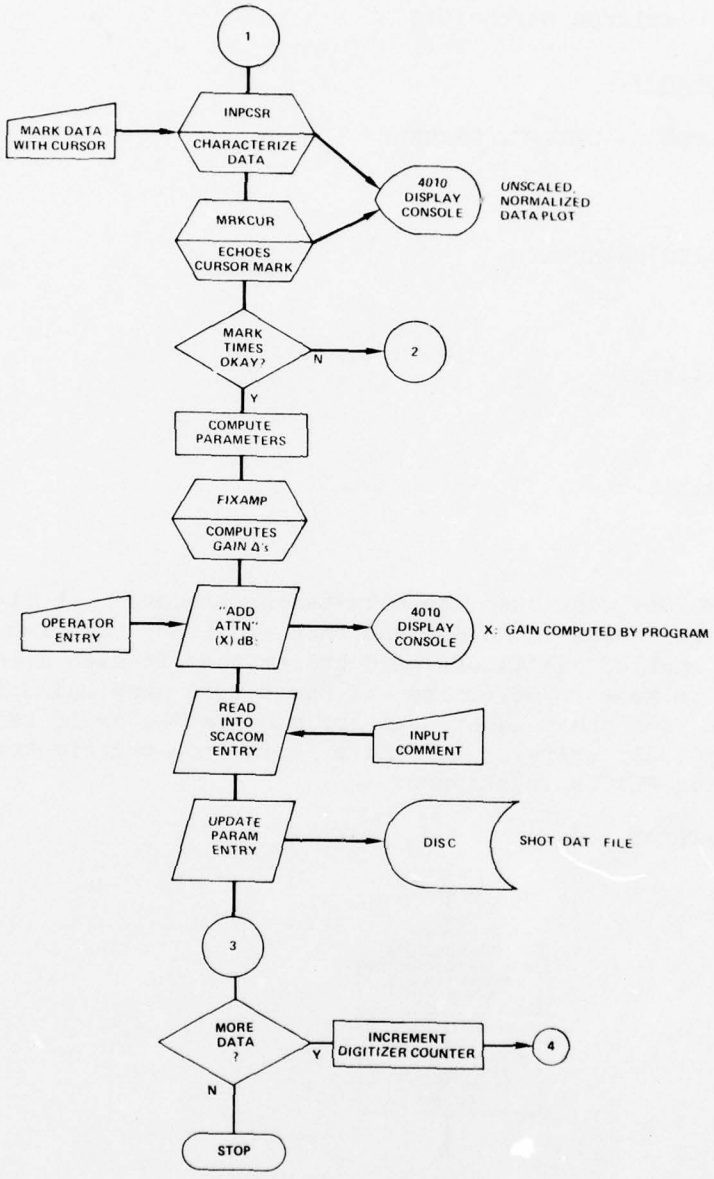
The operator is prompted to enter a comment of a maximum length of 24 characters; the comment is also stored in COMMON PARAM.

As a final step for each digitizer, COMMON PARAM is written to disc file MAIN.DAT.

Flowchart: MARK



Flowchart: MARK (Cont'd)



MORDAT MOR

MACRO-11 Written March 1977

Called Subroutines:

GETDAT, CMDDIG, SETVEC, DSKERR

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TI:, digitizers

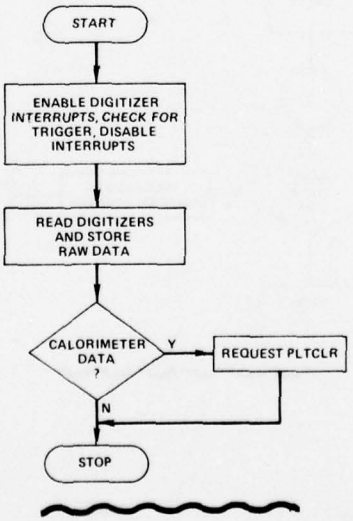
COMMON Area:

SYSCON partition

Description:

Program MORDAT continues the data-taking process. It first displays the message "MORDAT RUNNING" and then acquires the raw shot data from the enabled digitizers and stores them in disc file MAIN.DAT. A check is made to determine if there were any calorimeter data collected for this shot; if so, program PLTCLR is requested and program MORDAT exits. If there were no calorimeter data, the request for PLTCLR is skipped.

Flowchart: MORDAT



OFFLIN OFF

MACRO-11 Written May 1976
Modified January 1977

Called Subroutines:

DIGERR, LSTERR

I/O Devices:

TI:, digitizers

Description:

Program OFFLIN is run to check all of the enabled digitizers to see if any of them are off-line and, if they are, to flag them with the error condition (OFF). The computer operating system interrupt handler for vector address 4 is replaced by a trap to program OFFLIN and an initialize command is sent to each enabled digitizer. A digitizer off-line will cause a trap through vector address 4 and the digitizer will then be flagged out.

OUTFIL OUT

MACRO-11 Written April 1976
Modified January and March 1977

File:

DK1:[100,100]MAIN.DAT

COMMON Area:

SYSCON partition

Description:

Program OUTFIL creates a zero-filled, noncontiguous file on disc 1 with the name MAIN.DAT;1. If this file already exists on disc 1, a new file, with the next-higher version number, will be created. The length of this file is controlled by the number-of-blocks item in SYSCON COMMON.

PLOTC PLT

FORTRAN Written March 1977

Description:

Program PLOTC is a dummy main program for program PLTCLR. Its sole purpose is to accomplish the FORTRAN input-output initialization for subroutine ANOCLR. This initialization could be done directly in program PLTCLR, except that the Digital Equipment Corporation has not seen fit to document the procedure.

PLTCLR PLT

MACRO-11 Written August 1976
Modified March 1977

Called Subroutines:

CALPLT

File:

DK1:[100,100]Cssss02.DAT (ssss = current shot number)

COMMON Area:

SYSCON partition

I/O Devices:

TT0:, LP0:

Description:

Program PLTCLR plots and annotates the calorimeter data on the Tektronix R4010 terminal and then causes hard copies of these plots to be made on the line printer (LP0:).

PRB PRB

FORTRAN Written May 1976

Called Subroutines:

ANSWER, ASDCD, FLDCD, FXDCD, INPUT, PRBREF (PINIT, PNEW, PRDENT, PRDNEX, PRESET, PWRADD, PWRENT)

File:

DK0:[100,100]PRBCAL.DAT

I/O Devices:

TI:, LP0:

Description:

Program PRB is used to generate, modify, or list probe file PRBCAL.DAT. Its operation is essentially the same as the operation of program ATN; hence, the reader is asked to reference that description for details on this program's operation. The input of a balun number that is not a 1, 2, or 3 will cause an immediate error flag.

PREDAT PRE

MACRO-11 Written April 1976
Modified January and March 1977

Called Subroutines:

CLRCBD, CMDDIG

I/O Devices:

TI:, digitizers

COMMON Area:

SYSCON partition

Description:

Program PREDAT prepares the enabled digitizers for acquiring a data trace. It must be run before program DATAPC is run. The digitizer interrupts are disabled and the digitizers are initialized, switched to digital mode and checked to insure that they are in single sweep mode. Standard SASP error codes will be listed on TI: for any error conditions found. The program will set event flag 35 upon exit.

PRTNAM PRT

FORTRAN Written May 1976
Modified January 1977

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program PRTNAM prints out on TI: the name of the shot file to which SYSCON points.

RAWCPY RAW

FORTRAN Written May 1976
Modified August 1976, January and March 1977

Called Subroutines:

ASDCD, DATFIO (OPENS, READB, READR, WRITER, CLOSES), GRARAW, HDCOPY, INPUT, PLTSF

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TT0:, TT1:, LP0:

COMMON Areas:

SYSCON partition, HPTR, RAWDAT, PARAM, ASTV

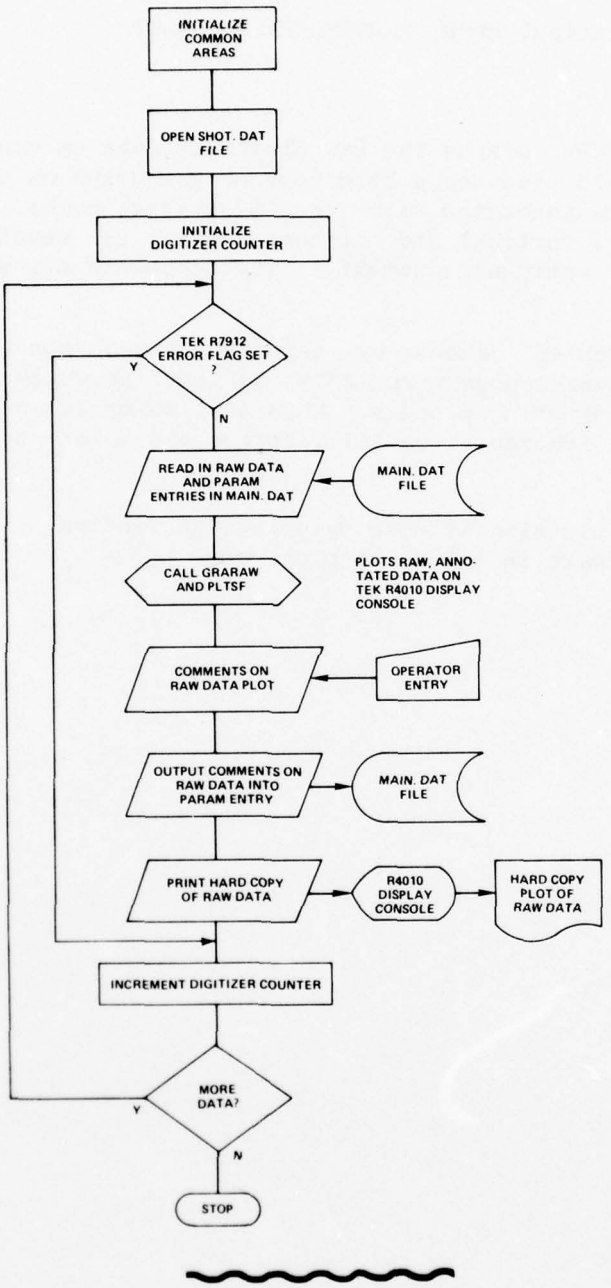
Description:

Program RAWCPY graphs the raw digitizer data on the Tektronix R4010 terminal and produces a hard copy of the graph on the line printer. The graph is annotated with the digitizer number, channel number, shot number, vertical and horizontal digitizer sensitivities and the operator's optional comment. The comments are stored in COMMON SYSCON.

Due to a problem caused by repeated values from the raw digitizer data, an asynchronous trap (AST) is set up which uses TT1: during the actual plotting process. This AST, which is activated by typing the "escape" character on TT1:, forces the plot to the next set of data points.

The actual plotting is done by using the Tektronix Terminal Control System software in the point plot mode.

Flowchart: RAWCPY



RECCAL REC

FORTRAN Written March 1977

Called Subroutines:

ASDCD, DATFIO (OPENS, READB, CLOSES), FSCIN

Files:

DK1:[100,100]Ssssso2.DAT, DK0:[100,100]SYSCON.DAT
(ssss = shot number)

I/O Devices:

TT0:, LP0:

COMMON Area:

SYSCON internal

Description:

Program RECCAL is used to produce hard copies of the calibration traces from a specified shot file (Ssssso2.DAT). The copy of SYSCON stored as a part of the shot file is used in an internal COMMON block, rather than the copy kept in the SYSCON partition. (See the writeup on subroutine FSCIN.) The calibration traces are drawn on the Tektronix R4010 terminal and are automatically hard copied on the line printer.

Programs SHOTNO and SAVCON must be run before program RECCAL is run to get the disc copy of SYSCON pointed at the correct shot file.

SAVCON SAV

MACRO-11 Written January 1977

Called Subroutines:

SCIO(SCOUT)

File:

DK0:[100,100]SYSCON.DAT

COMMON Area:

SYSCON partition

Description:

Program SAVCON copies the contents of the SYSCON COMMON partition to file SYSCON.DAT. Program SAVCON must be run before the computer is shut down.

Before program SAVCON is installed, it will be necessary to remove the operating system program SAV (REM SAV).

SCACPY SPY

FORTRAN Written May 1976
Modified August 1976, January and March 1977

Called Subroutines:

FSCIN, DATFIO (OPENS, READB, READR, WRITER, CLOSES), PRBSCH, GRASCA, ANOSCA, HDCOPY

Files:

DK0:[100,100]PRBCAL.DAT, DK1:[100,100]SsssO2.DAT,
DK0:[100,100]SYSCON.DAT
(ssss = shot number)

I/O Devices:

TT0:, LP0:

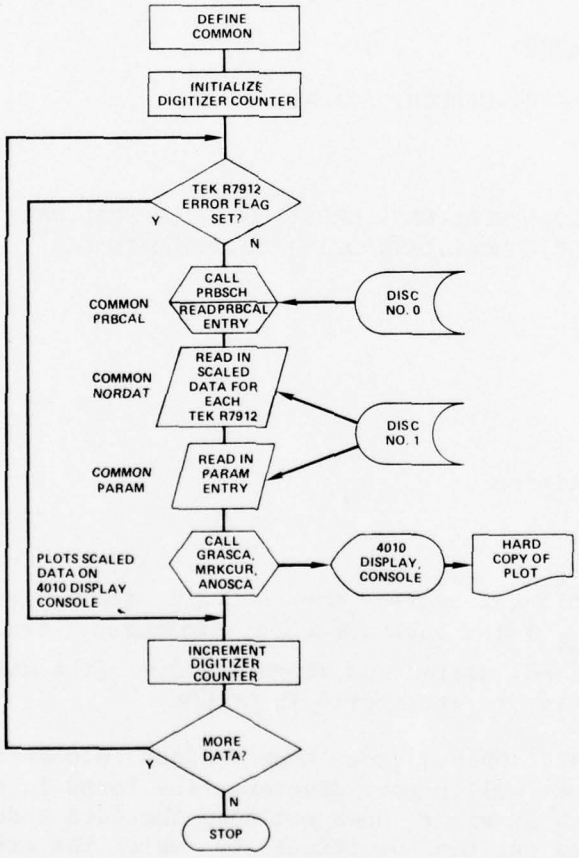
COMMON Areas:

SYSCON internal, NORDAT, PRBCAL, PARAM

Description:

Program SCACPY graphs the finalized scaled data from each digitizer on the Tektronix R4010 terminal. The operator is prompted for a comment, with a maximum length of 24 characters, and a hard copy of the plot is produced on the line printer. The plot is scaled so that the vertical units per division are a readily usable number, that is, 1, 2, or 5 times some power of 10. Operator comments are written into the shot file (SssssO2.DAT). (Description continued on p. 38.)

Flowchart: SCACPY



The copy of SYSCON stored as a part of the shot file is used in an internal COMMON block rather than the copy in the SYSCON partition. (See the writeup on subroutine FSCIN.)

If program SCACPY is run in the normal data-taking sequence, the disc file version of SYSCON will point to the correct shot file, but if it is run out of sequence, programs SHOTNO and SAVCON will have to be run first.

SCALE SCA

FORTRAN Written May 1976
Modified January 1977

Called Subroutines:

ATNSCH, CALCSF, PRBSCH, SCADAT, XCHSCH

Files:

DK0:[100,100]ATNCAL.DAT, DK0:[100,100]PRBCAL.DAT,
DK0:[100,100]XCHCAL.DAT, DK1:[100,100]MAIN.DAT

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program SCALE calculates the overall scale factor and data link delay (Δt_{data}) for each enabled digitizer. The raw digitizer data are normalized, scaled and stored in disc file MAIN.DAT. The delays and scale factors are stored in SYSCON.

Program SCALE checks the knob readout information stored with the raw data and will report discrepancies found in standard SASP error codes. Such an error does not stop the data reduction process, but it does flag out the digitizer on which the error occurred. That digitizer will remain disabled until the flag is manually cleared by the operator using either program FLAG or CLEAR.

If a data overflow error occurs in program MORDAT, a knob error will be generated for that digitizer by program SCALE because the knob data are actually missing from the shot file.

Algorithms:

The contributions to the overall system gain, G_{SYS}, in decibels are given in the following equation:

$$G_{SYS} = G_A + G_P + G_D + G_B + G_{TA} + G_{DL} ,$$

where

G_A = attenuator gain,

G_P = probe gain,

G_D = device (a second attenuator) gain,

G_B = transmitter balun gain,

G_{TA} = transmitter attenuator gain,

G_{DL} = transmission channel gain.

G_{DL} is calculated by program CHKCAL using the equation

$$G_{DL} = 20 \log_{10} (|CTP| - |CTZ|)/\text{calibrator output voltage},$$

where

CTP = operator measured calibration trace peak,

CTZ = operator measured calibration trace zero.

This includes any attenuator between the optical receiver and the digitizer.

The scale factor is the overall system gain in units of digitizer volts divided by the units of the measurement probe:

$$A_{SYS} = \log_{10}^{-1} \left(G_{SYS}/20\right).$$

The normalized data are in units of digitizer points. There are 64 such points per vertical division. Therefore, scaled data values are calculated by the following equation:

$$\text{Scaled (selected units)} = \frac{\text{Normalized (points)} \times \text{vertical sensitivity (V/div)}}{64\ \text{(points/div)} \times A_{SYS}\ \text{(V/selected units)}} .$$

The overall system delay, D_{SYS}, is computed from the following equation:

$$D_{SYS} = D_A + D_P + D_{TC} + D_D + D_{DL} + D_{RC} ,$$

where

D_A = attenuator delay,

D_P = probe delay,

D_{TC} = pretransmitter cable delay,

D_D = device (a second attenuator) delay,

D_{DL} = transmission channel delay,

D_{RC} = postreceiver delay.

SCAVP SVP

FORTRAN Written October 1976
Modified January and March 1977

Called Subroutines:

FSCIN, PRBSCH, GRAPHV, ANOT8, DATFIO (OPENS, READB, READR, CLOSES)

Files:

DK0:[100,100]SYSCON.DAT, DK0:[100,100]PRBCAL.DAT,
DK1:[100,100]SsssO2.DAT, DK1:[100,100]VDATA.BIN
(ssss = shot number)

COMMON Areas:

SYSCON internal, NORDAT, PRBCAL, PARAM

Description:

Program SCAVP produces disc file VDATA.BIN containing the plots of the finalized scaled data from each enabled digitizer. These plots are scaled so that the vertical units per division are a readily usable number, that is, 1, 2, or 5 times some power of 10.

The copy of SYSCON stored as a part of the shot file is used in an internal COMMON block rather than the copy in the SYSCON partition. (See the writeup on subroutine FSCIN.)

If program SCAVP is run in the normal data-taking sequence, the disc copy of SYSCON will point to the correct shot file, but if it is run out of sequence, programs SHOTNO and SAVCON will have to be run first.

Versatec Corporation program VCOPY must be run to convert disc file VDATA.BIN to actual commands to the line printer to produce the plots.

SETFLG SFL

FORTRAN Written January 1977

Called Subroutines:

ANSWER, CHNERR, DCDBIT, DIGERR, PAGE

File:

DK0:[100,100]FLAG.DAT

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program SETFLG, a superset of program FLAG, writes the digitizer and channel flag information to file FLAG.DAT. Program SETFLG queries the operator with the same questions as program FLAG does.

SHOTNO SHO

FORTRAN Written April 1976
Modified January 1977

Called Subroutines:

ASDCD, FXDCD, IASCII, INPUT

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program SHOTNO is run to enter the simulator code (for example, O2 for the OWL II machine) and the shot number into SYSCON. Standard SASP terminal input conventions apply. A null input for the simulator code is permissible if it has already been entered into SYSCON from a previous invocation of program SHOTNO. A four-digit number must be entered for the shot number. This information is stored in SYSCON both as an integer and in ASCII format; hence, leading zeros must be supplied.

Program SHOTNO is the means through which the current shot file is established and past shot files are referenced.

The location for running program SHOTNO has been changed in the standard data sequence. It is now run before program CHKCAL since CHKCAL now prints the shot number on the graphs of the calibration pulses.

SNAPIT SNA

MACRO-11 Written March 1977

I/O Device:

LP0:

COMMON Area:

SYSCON partition

Description:

Program SNAPIT is a diagnostic tool for use only by the system programmer. Using the system SNAP$ macro, it dumps the SYSCON header and arrays IDIG and ICHAN in a standard RSX-11M dump format: octal, ASCII, and RAD50.

SUMERR SUM

FORTRAN Written June 1976
Modified January 1977

Called Subroutine:

DCDBIT

I/O Device:

LP0:

COMMON Area:

SYSCON partition

Description:

Program SUMERR prints the error codes which have been set for each digitizer and channel in the system configuration.

SYSCHK CHK

FORTRAN Written May 1976
Modified January 1977

Called Subroutines:

ATNSCH, PRBSCH

Files:

DK0:[100,100]ATNCAL.DAT, DK0:[100,100]PRBCAL.DAT

I/O Device:

LP0:

COMMON Area:

SYSCON partition

Description:

Program *SYSCHK checks the validity of the following* entries in SYSCON: attenuator identification (ID), probe ID, device ID, transmitter attenuation, sweep rate, vertical sensitivity, and baseline trace offset. Only those items found to be in error are printed; a blank implies a valid entry.

SYSDMP SYS

FORTRAN Written June 1976
Modified January 1977

I/O Device:

LP0:

COMMON Area:

SYSCON partition

Description:

Program SYSDMP produces a quick-look dump of the meaningful contents of SYSCON. It is a diagnostic tool for the operator's use only. Digitizer UNIBUS addresses and digitizer and channel error flags are printed in octal; all other numbers are decimal.

TABIN TAB

FORTRAN Written April 1976
Modified October 1976, January 1977

Called Subroutines:

ASDCD, DSKERR, FXDCD, IASCII, INPUT, SCIO(SCOUT), SCMAIN

Files:

DK1:[100,100]MAIN.DAT, DK1:[100,100]SssssO2.DAT,
DK0:[100,100]SYSCON.DAT
(ssss = shot number)

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Program TABIN queries the operator for two sets of information. The first set asks for the type of wire used in the OWL II machine, the pulse charge, the tank vacuum pressure, the voltage diode peak, the current diode peak and a comment not to exceed 30 characters. The second set asks for a code for the debris shield, the number of thicknesses of debris shield, a code for the filter and the filter thickness. This information is stored in SYSCON and SYSCON is then written into file MAIN.DAT. Following this operation, the name of file MAIN.DAT is changed to SssssO2.DAT. As a final step, SYSCON is written into disc file SYSCON.DAT.

TABLES TBL

FORTRAN Written March 1977

Called Subroutines:

FSCIN, DATFIO (OPENS, READR, CLOSES), ATNSCH, PRBSCH, XCHSCH, XCHDRI

Files:

DK0:[100,100]SYSCON.DAT, DK0:[100,100]ATNCAL.DAT,
DK0:[100,100]PRBCAL.DAT, DK0:[100,100]XCHCAL.DAT,
DK1:[100,100]SssssO2.DAT
(ssss = shot number)

I/O Device:

LP0:

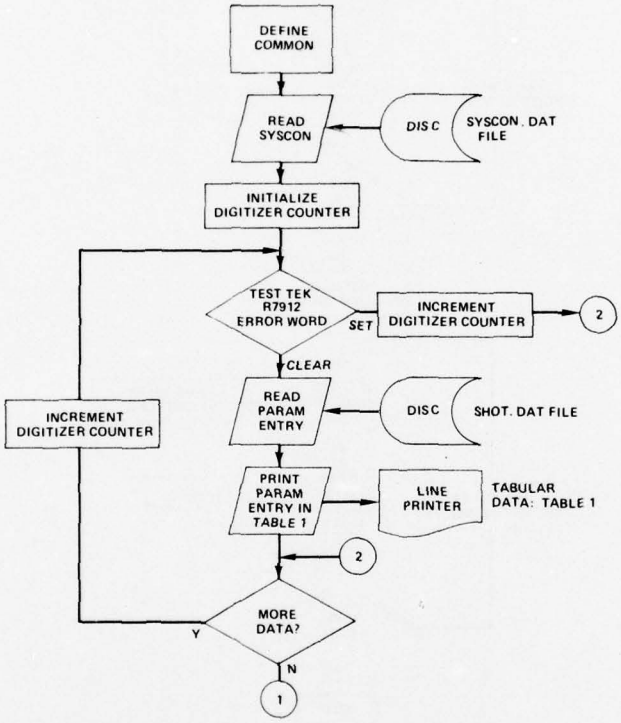
COMMON Areas:

SYSCON internal, PRBCAL, ATNCAL, XCHHDR, XCHCAL

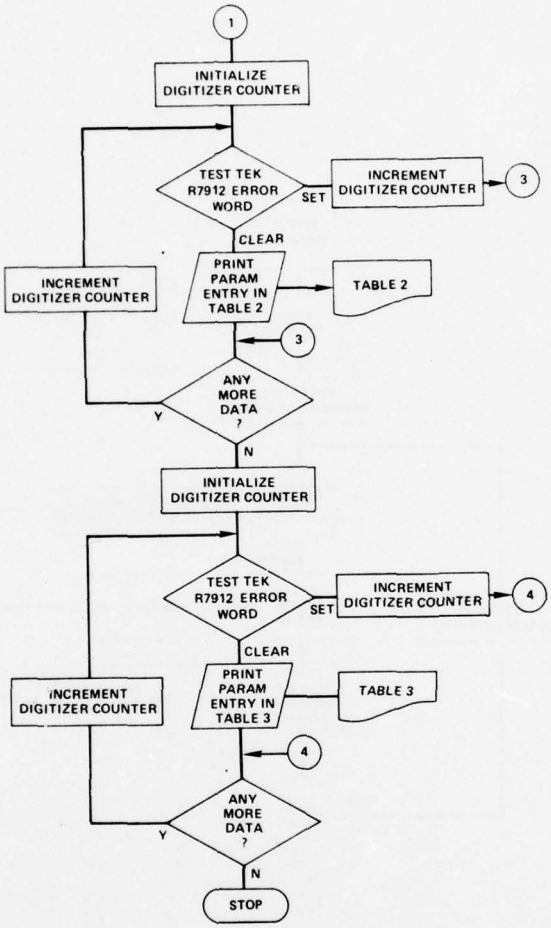
Description:

Program TABLES produces three tables of summary information: a table of system gains, a table of system delays, and a table of the transmitter number and calibration voltage for each enabled channel plus an error summary for each enabled digitizer. The formats of these three tables were prescribed by the Mission Research Corporation of San Diego, California. These dicta were followed exactly.

Flowchart: TABLES



Flowchart: TABLES (Cont'd)



USRCOM USR

FORTRAN Written May 1976
Modified January 1977

Called Subroutines:

ASDCD, INPUT, UCOUT, FSCIN

File:

DK1:[100,100]Sssss02.DAT
(ssss = shot number)

I/O Device:

TI:

COMMON Area:

SYSCON internal

Description:

Program USRCOM allows the operator to input up to a 64-character comment for each enabled digitizer in the system configuration. These comments are written into the shot file.

VCOPY VCO

FORTRAN Written by Versatec Corporation
Modified January 1977

Files:

DK1:[100,100]VPLOT.BIN, DK1:[100,100]VDATA.BIN,
DK1:[100,100]VWORK.BIN

I/O Devices:

TI:, LP:

Description:

Program VCOPY uses file VPLOT.BIN as input and generates the scaled plots. The program has three options: (1) to produce the graphs band by band and print them on the Versatec line printer, (2) to produce the entire graph and then print it on the Versatec line printer, and (3) to produce all of the graphs and store them in file VDATA.BIN. A "band" is 1024 words of plot data, approximately ½ in. (1.25 cm) of a graph. On TI:, VCOPY asks the operator which option he desires. Under option 2, it also asks how many copies of each graph are to be made.

Normally, option 3 is used and the graphs are printed by using program FPLOT. VCOPY is checkpointable and runs as a background program; it requires about 2½ minutes per graph.

XCH XCH

FORTRAN Written May 1976

Called Subroutines:

ASDCD, FLDCD, FXDCD, INPUT, XCHREF (XNEW, XRDENT, XWRENT, XWRHDR)

File:

DK0:[100,100]XCHCAL.DAT

I/O Devices:

TI:, LP0:

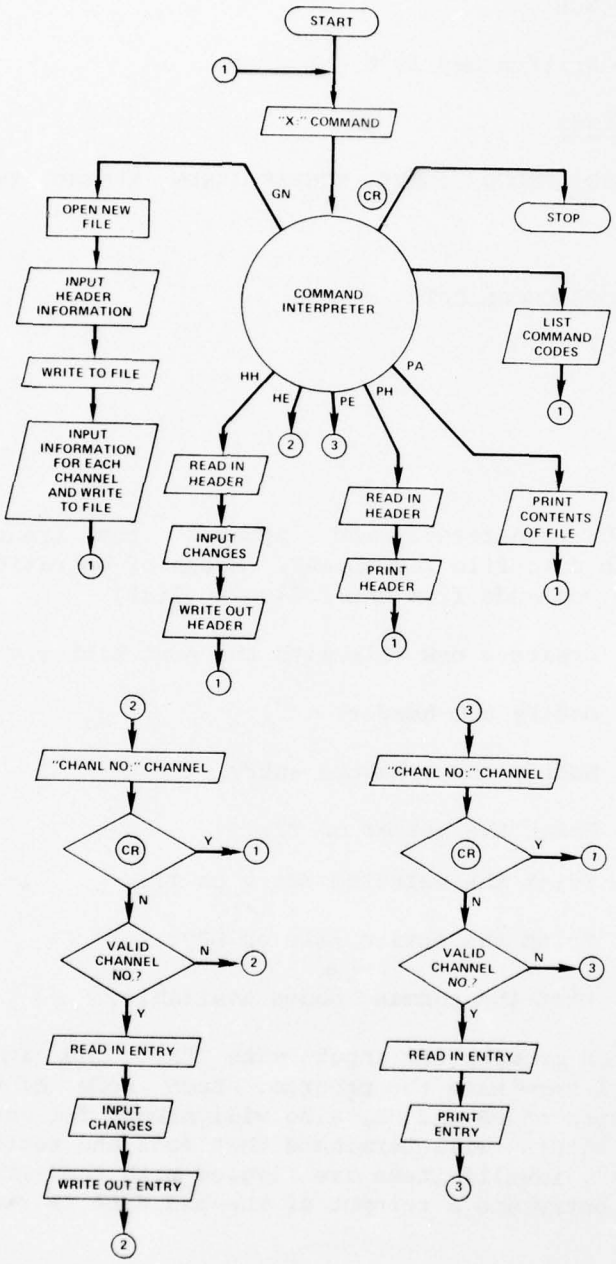
Description:

Program XCH generates and updates the transmission channel calibration disc file XCHCAL.DAT. Modes of operation are controlled by issuing commands from the following list:

GN	Create a new file with the next higher version number.
MH	Modify the header.
ME	Modify the selected entry.
PH	Print the header on TI:.
PE	Print the selected entry on TI:.
PA	Print the entire file on LP0:.
HE[LP]	List the command codes available.

Program XCH prompts for input with "X:"; an immediate carriage return will terminate the program. Each mode of program XCH, with the exception of PA and HE, also will prompt for input; an immediate carriage return will terminate that mode and restore the general prompt "X:"; invalid items are flagged with the symbol "XX" printed below the entry and a reinput of the bad data is requested.

Flowchart: XCH



3. INDIVIDUAL SUBROUTINE DOCUMENTATION

The following standard entries have been used to document the SASP subroutines.

Entry	Definition
Subroutine name	The subroutine name
Date of documentation	The date of documentation
Language	DEC PDP 11 FORTRAN or MACRO-11
Date written	The date that this subroutine was written
Modified	Dates on which the subroutine was modified
Files	Disc files referenced by the subroutine
I/O Devices	Input/output devices utilized other than disc
Arguments	The list of arguments passed to or from the subroutine
Description	A general narrative description
Algorithms	A description of any significant algorithms used
COMMON Areas	COMMON areas
Flowchart	The flowchart
Typical Output	The output from the subroutine

The above entries are included only as needed.

ABSPKV

FORTRAN Written October 1976

Argument:

ABIG Returns the magnitude of the peak element of array ATC(512).

COMMON Area:

NORDAT

Description:

ABSPKV is called by subroutine GRASCA from programs SCACPY and SCAVP. It computes the absolute peak value of the normalized scaled data array ATC.

ANOCLR

FORTRAN Written February 1977

Arguments:

CNO Name of the calorimeter in ASCII
CAL Value, in calories per square centimeter, measured by that calorimeter
UNC Calculated uncertainty of the measured value.

COMMON Area:

SYSCON partition

Description:

Subroutine ANOCLR annotates the graphs of the calorimeter data produced by program PLTCLR.

ANOMRK

FORTRAN Written May 1976
Modified October 1976

I/O Device:

TT0:

Argument:

N7912 The digitizer number

COMMON Area:

SYSCON partition

Description:

ANOMRK is used to annotate the graphs produced by program MARK. All write statement positioning on the Tektronix R4010 terminal screen is done by using the Tektronix Terminal Control System graphics package.

ANOSCA

FORTRAN Written May 1976
Modified October 1976

File:

DK0:[100,100]PRBCAL.DAT

I/O Device:

TT0:

Arguments:

N7912	Digitizer number
YMAX	Vertical scale factor scaled so that $0.1 \leq YMAX \leq 1$
N	Power of 10 associated with YMAX so that the actual vertical scale factor equals $YMAX \times 10^N$

COMMON Areas:

SYSCON, PRBCAL, PARAM

Description:

Subroutine ANOSCA annotates the final scaled graphs produced by program SCACPY. All parameter values shown on the graph come from the COMMON blocks. SYSCON and PARAM are read from the shot file; PRBCAL is taken from the file PRBCAL.DAT.

ANOT8

FORTRAN Written January 1977

Files:

DK1:[100,100]VPLOT.BIN, DK0:[100,100]PRBCAL.DAT

Arguments:

N7912	Digitizer number
YMAX	Vertical scale factor scaled so that $0.1 \leq YMAX \leq 1$
N	Power of 10 associated with YMAX so that the actual vertical scale factor equals $YMAX \times 10^{N}$

COMMON Areas:

SYSCON, PRBCAL, PARAM

Description:

Subroutine ANOT8 annotates the final scaled graphs produced by program SCAVP. All parameter values shown on the graph come from the COMMON blocks. SYSCON and PARAM are read from the shot file; PRBCAL is taken from the file PRBCAL.DAT.

ANSWER

MACRO-11 Written May 1976

I/O Device:

TI:

Argument:

ANSWER	0	No
	1	Yes

Description:

Subroutine ANSWER accepts a single character from the terminal. If and only if this character is the letter Y, a one is returned; any other character or a null input is interpreted as an N and a zero is returned.

ASCBIN

MACRO-11 Written December 1976

Arguments:

NOB	Number of bytes to be processed
INPUT	Address of input buffer
OUTPUT	Address of output buffer

Description:

Subroutine ASCBIN converts ASCII numeric input to integer format numbers. The maximum number that can be converted is 32767.

ASDCD

MACRO-11 Written May 1976
Modified January 1977

Arguments:

Null flag:
- 1 The first character is blank.
- 0 The input has been received.
- -1 The field is empty.
- -2 The field does not exist.

Field number: A pointer to the desired field in the input stream

Output character string: A pointer to the storage area for the requested output

Count of requested characters: INTEGER count

Description:

Subroutine ASDCD passes an ASCII field from the terminal input buffer. The action taken is a function of the null flag:

Null flag is zero: the output string is blank filled. Characters are then transferred from the requested field in the input stream until that field is exhausted or the requested number of characters has been transferred.

Null flag is one: the entire output string is set to blanks.

Null flag is negative: no action is taken. The output string remains unchanged.

ASTSC

MACRO-11 Written November 1976

COMMON Area:

ASTV

ENTRY points:

ASTSET
ASTCLR
ESCAPE Asynchronous system trap (AST) entry point

Description:

Entry point ASTSET issues a QIO$ macro to read one character from TT1:, with an AST entry request for location ESCAPE. The variable STOP in COMMON area ASTV is set to a value of zero.

Entry point ASTCLR issues a QIO$ macro with the I/O kill (IO.KILL) condition to clear the I/O request generated by a call to ASTSET. The variable STOP in COMMON area ASTV is set to a value of zero.

The AST entry point ESCAPE is entered through operating system control when the escape key is pressed on TT1:. The variable STOP in COMMON area ASTV is set to minus one and an AST exit macro (ASTX$S) is issued.

Subroutine ASTSC is used by program RAWCPY to force the program to the next set of points to be plotted when the escape key is pressed on TT1:.

ATNREF

MACRO-11 Written May 1976

File:

DK0:[100,100]ATNCAL.DAT

Argument:

Entry point ARDENT: Device identification
Other entry points: (No arguments)

Description:

ATNREF is a multiple entry point subroutine used by program ATN for all references to disc file ATNCAL.DAT. This file is opened and closed with each call to the subroutine. Entry point functions are described below:

AINIT	Initialize the last record pointer and clear the current record pointer.
ANEW	Create a new disc file, with the next-higher version number, containing only an end-of-file record.
ARDENT	Search through the disc file for an entry matching the device identification in the argument. A record consisting of all minus ones signifies that no matching record was found.
ARDNEX	Get the next record from the disc file.
ARESET	Clear the current record pointer.
AWRADD	Append a new record to the end of the disc file.
AWRENT	Rewrite and, hence, update the current disc file record.

ATNSCH

MACRO-11 Written May 1976

Modified January 1977

File:

DK0:[100,100]ATNCAL.DAT

I/O Device:

TI:

Argument:

Device identification

Description:

Subroutine ATNSCH searches disc file ATNCAL.DAT for the record corresponding to the identification in the argument and returns this record if it finds it. If the record is not found, an end-of-file message is displayed on TI:. Disc file ATNCAL.DAT is opened and closed with each call to the subroutine.

ATTEN

MACRO-11 Written July 1976

Arguments:

Attenuator setting
Mode setting: 0 Turn on transmitters; reverify attenuator settings.
1 Turn off transmitters.
2 Generate calibration sequence.
Transmitter address
Error flag

Entry points:

ATTEN
TRIGB

Description:

Entry point ATTEN controls the operation of the fiber optic transmitters and the setting and verification of the attenuators within these transmitters. Actual control of the transmitters is by the transmitter control box, which interfaces to the computer through a DR-11K circuit board. A turn-on command causes the transmitter control box to generate a sequence of commands to the transmitter. These commands turn the transmitter on, set the remote attenuator, accept the attenuator verification information from the transmitter, and return this information, through the DR-11K circuit board to the subroutine. A turn-on command to a transmitter that is already on causes this transmitter to return the attenuator verification information. This procedure is used to reverify the attenuator settings in program CONDAT after the data shot.

A turnoff command simply turns that transmitter off.

A calibration sequence command sends a request for attenuator verification to each transmitter while the transmitter is on. This command causes the transmitter to resend the attenuator verification information, which is ignored, and to turn on the internal calibrator. The digitizers are triggered, and these calibration signals are recorded. The fiducial marker pulse is inhibited during the calibration sequence.

Entry point TRIGB is used to send a baseline trigger command to the transmitter control box. The fiducial marker is inhibited during the baseline trigger sequence.

An internal subroutine, SEND, is used to actually send the commands to the transmitter control box and to receive information from this box.

BASATC

MACRO-11 Written April 1976

Arguments:

Bloom parameter
Error word

Description:

Subroutine BASATC performs the average to center of trace (ATC) step of the baseline normalization process. The bloom parameter is calculated as the average separation in digitizer points between each set of dual vertical readings obtained from the digitizer. The

value of the bloom parameter is checked to insure that it is between the values of variables BLMMIN and BLMMAX; if it is outside of this range, the error word is set to a value of nine. The count of the number of dual verticals (readings with two and only two vertical values) is compared with the value of variable NPTMIN and, if this count is found to be less than NPTMIN, the error word is set to a value of nine. These three variables are defined in the SYMDEF macro.

BUSY

MACRO-11 Written April 1976

Arguments:

R1 The digitizer UNIBUS address
R2 An error word

Description:

Subroutine BUSY allows the digitizer, whose UNIBUS address is in register one (R1), a time equal to the value of variable CNTBZY seconds to exit from a busy status. If the digitizer status is still busy after that time, register two (R2) is set to a value of four. Variable CNTBZY is defined in the SYMDEF macro.

CALATC

MACRO-11 Written April 1976

Argument:

Bloom parameter for the specified digitizer

Description:

Subroutine CALATC performs the average to center of trace (ATC) step of the normalization process for the calibration trace. The bloom parameter is calculated by subroutine BASATC.

CALCSF

MACRO-11 Written May 1976
Modified January 1977

Files:

DK0:[100,100]ATNCAL.DAT, DK0:[100,100]PRBCAL.DAT,
DK0:[100,100]XCHCAL.DAT

COMMON Area:

SYSCON partition

Arguments:

Digitizer number
System gain in decibels

Description:

Subroutine CALCSF calculates the total system gain and delay for each digitizer. The delay is stored in SYSCON; the gain is returned to the calling program (SCALE).

Algorithms:

The writeup for program SCALE gives the algorithms used by this subroutine.

CALIB Source File: CALSPC.MAC

MACRO-11 Written July 1976
Modified January and March 1977

I/O Devices:

TI:, attenuator control unit

Argument:

MODE 0 Turn transmitter on.
1 Turn transmitter off.
2 Generate calibrate sequence.

Description:

Subroutine CALIB handles the routing of commands to the attenuator control unit to turn the transmitters on and off and to generate the calibration-strobe signal and trigger for the digitizers. Commands are sent to the enabled channels only. Errors are listed, but the channels on which errors occur are not flagged out.

A similar subroutine CALIB, source file CALIB.MAC, not currently used in SASP, is available. The only difference between these two subprograms is that this second version does flag out channels on which errors occur.

CALOR

FORTRAN Written July 1976
Modified October 1976

Arguments:

NTZERO	(No longer in use)
TDEAD	(No longer in use)
AD	Uncertainty value for calorimeter A
BD	Uncertainty value for calorimeter B
COEF3	(No longer in use)
COEF4	(No longer in use)
TMAX	Maximum measurement time for both calorimeters
NACNT	Number of readings taken from calorimeter A
NBCNT	Number of readings taken from calorimeter B
A	Calculated number of calories per square centimeter for calorimeter A
B	Calculated number of calories per square centimeter for calorimeter B
IERR	Error flag--nonzero value indicates device timeout

COMMON Area:

CLRDAT

Description:

Subroutine CALOR calculates the number of calories per square centimeter incident on each calorimeter and a measure of the uncertainty of this measurement.

CALPLT

MACRO-11 Written August 1976

I/O Device:

TT0:

Arguments:

Number of data point pairs
Address of data array

Description:

Subroutine CALPLT graphs the calorimeter data on the Tektronix R4010 terminal (TT0:). The actual graphing is done by using the Tektronix Terminal Control System software package.

CHACNT

MACRO-11 Written September 1976

Arguments:

Address of character string to be examined
Maximum length of this character string
Number of nonblank characters in string

Description:

Subroutine CHACNT counts the number of nonblank characters in the input string and returns this count in an integer format number.

CHKTRG

MACRO-11 Written March 1976

I/O Devices:

TI:, digitizers

COMMON Area:

SYSCON partition

Description:

Subroutine CHKTRG checks each enabled digitizer to determine if the sweep was triggered. The digitizer interrupt handler subroutine INTDIG locks the memory of an interrupting digitizer; therefore, subroutine CHKTRG uses this locked memory status as an indication that the digitizer sweep has triggered. An error code of six is flagged and listed for those digitizers which do not show a triggered status after a time equal to the value of variable CNTCMD in seconds. The variable CNTCMD is defined in the SYMDEF macro.

CHNERR

MACRO-11 Written April 1976

COMMON Area:

SYSCON partition

Arguments:

Error word
Dummy argument
Channel number

Description:

Subroutine CHNERR flags channel errors and disables the associated digitizers. A BIS (bit set) instruction is used to incorporate the current error into the channel error word so that no previous error flags will be lost.

CLRCBD

MACRO-11 Written March 1976

I/O Devices:

Digitizer controller circuit boards

Argument:

Number of digitizer controller circuit boards

Description:

Subroutine CLRCBD clears the digitizer controller boards, hence disabling digitizer interrupts. UNIBUS addresses used are these:

$$ADRCB1 + n \times 1000_8, \quad n = 0, 1, \ldots, m - 1,$$

where m is the passed argument.

ADRCB1 = 164000_8 and is defined in the SYMDEF macro.

CMDDIG

MACRO-11 Written July 1976

I/O Devices:

TI:, digitizers

Arguments:

Set or clear mode (1|0)
Command word
Digitizer status word

COMMON Area:

SYSCON partition

Description:

Subroutine CMDDIG is used to send commands to the enabled digitizers and to confirm that they have been executed. CMDDIG can handle any digitizer command except "read data." The status word passed to CMDDIG is the expected digitizer status after command execution and is compared to the actual digitizer status using a BIT (bit test) instruction to confirm that the command has been executed. If status bits are set by the command, the mode argument must be set; if status bits are cleared by the command, the mode must be clear. Command and status words are defined in the SYMDEF macro.

If a digitizer remains busy for a time equal to the value of variable CNTCMD in seconds, it is flagged with an error code of four. If a command does not execute, repeated attempts are made for a duration of CNTCMD seconds, and if the command still has not been executed, the digitizer is flagged with an error code of five.

Each command is sent once to each digitizer before the check for execution is made. The check re-entry process is done one digitizer at a time. Since some commands require a short time for execution, this method causes these times to occur in parallel, rather than as a composite sum.

DATATC

MACRO-11 Written April 1976

Argument:

Bloom parameter

Description:

Subroutine DATATC performs the average to center of trace (ATC) portion of the normalization of the actual shot data. Its operation is the same as that of subroutine CALATC, except that the DATATC operations are done by using floating point numbers.

DATFIO

MACRO-11 Written July 1976
Modified March and May 1977

File:

DK1:[100,100]file name

I/O Device:

TI:

Arguments:

See lists under each entry point.

Entry Points:

Name	Arguments
CLOSES	none
OPENS	name, length
READB	adr, nblk, iblk
READR	adr, words, recno
WRITEB	adr, nblk, iblk
WRITER	adr, words, recno

where

"name" is an array which contains the file name from character 14 through character "length" inclusively.

"length" is the position of the last byte in the file name.

"adr" is the address of the first word of the array for data transfer.

"nblk" is the number of 256-word disc blocks to be transferred.

"iblk" is the relative block number of the first block to be transferred.

"words" is the number of words to be transferred; its value must be an even divisor of 256.

"recno" is a pointer to the record number in the file, where each record is of "words" length.

Description:

Subroutine DATFIO provides an interface between FORTRAN and the SASP Files-11 format data files. DATFIO performs block I/O operations only, but it permits the user to simulate record I/O. Record transfers are buffered by disc blocks and may not result in actual disc read or write operations.

The function of each entry point is described below:

CLOSES	Writes out the last disc block from a record transfer and closes the file; for a block transfer operation it just closes the file.
OPENS	Opens the file.
READB	Reads in "nblk" disc blocks. If a record write was the preceding operation, the last disc block is written to the file before the read operation begins.

READR — Calculates the disc block required for the operation and, if it is not the current disc block in memory, reads it into memory. Starting at "adr" the desired record from this block is then transferred to the array. If a record write was the preceding operation, that disc block is written to the file before any other operations are done.

WRITEB — Writes "nblk" disc blocks from the array starting at "adr" into the file starting at relative disc block "iblk". If the preceding operation was a record write, that disc block is written to the file before any other operations are done.

WRITER — Calculates the relative disc block required for the write operation and, if it is different from the block currently in memory, writes the current block to the file and then reads the new block into memory. It then transfers "words" words from the array starting at "adr" to the point in the block pointed to by "recno".

DCDBIT

MACRO-11 Written May 1976

Arguments:

Selection word
Table of 16 four-character codes in ASCII
Output string

Description:

Subroutine DCDBIT is a bit decoder. Each bit in the selection word corresponds to a table entry, so that bit 15 corresponds to the first entry and bit 0, to the last. Each bit in the selection word that is set (a one) causes the corresponding table entry to be placed in the output string. The output string will have a byte length equal to four times the number of bits set to one in the selection word. The selection word is scanned from bit 15 through bit 0.

DIGERR

MACRO-11 Written April 1976

Arguments:

Error word
Digitizer number
Dummy argument

COMMON Area:

SYSCON partition

Description:

Subroutine DIGERR flags digitizer errors. The bit corresponding to the value of "error word" is set in the digitizer error word using a BIS (bit set) instruction to preserve any other existing error flags. If this error causes all of the digitizers associated with a channel to be disabled, that channel also is flagged as disabled.

DISABL

MACRO-11 Written May 1976

COMMON Area:

SYSCON Partition

Entry Points:

Name	Argument
DISCHN	Channel number
DISDIG	Digitizer number

Description:

Subroutine DISABL is used to set the disabled flag in either the digitizer error word or the channel error word.

DISCHN	If called through DISDIG, sets the channel disabled flag in the channel error word if all digitizers associated with that channel are disabled If called directly, sets the channel disabled flag in the channel error word, regardless of the status of the digitizers associated with the channel
DISDIG	Sets the disable bit in the digitizer error word

DSKERR

MACRO-11 Written February 1977

File:

The currently active file

I/O Device:

TI:

Argument:

STAT A global two-word array

Description:

Subroutine DSKERR is an asynchronous trap (AST) entry point for all disc reads and writes. The RSX-11M operating system causes the AST exit to be taken if a disc I/O error occurs. DSKERR converts the error number placed by the operating system in the low order byte of the first word of array STAT to ASCII and lists it on TI:. This listing is followed by a question to the operator asking him if he wants to abort the running program. The operator must respond with either a "Y" for yes or any other character for no. A "Y" answer causes an EXIT$S macro to be invoked terminating the program. An answer of no causes the carry bit to be set, followed by an AST return (ASTX$S macro). The calling program should then issue a branch on carry set (BCS) instruction to retry the I/O operation. The operator's decision is predicated on the type of error encountered.

ELIMPT

MACRO-11 Written April 1976

Argument:

Address of an array of 512 data points

Description:

Subroutine ELIMPT performs the noise point elimination step of the data normalization process. The operations are done by using floating point numbers. This subroutine is used only for the normalization of the shot data trace; an analogous integer form subroutine QKELIM is used for the baseline and calibration data traces.

ERRNUM

MACRO-11 Written March 1976

Arguments:

Error word
Result

Description:

Subroutine ERRNUM sets the result equal to the value of the highest set bit (left-most) in the error word.

EXTRAP

MACRO-11 Written April 1976

Argument:

Address of an array of 512 data points

Description:

Subroutine EXTRAP completes the normalization process for a baseline trace. If necessary, the ends of the trace are extrapolated to provide a complete trace of 512 points by using the value of the average of the first five good points on the left end of the line and the last five good points on the right end of the line. Then 256 is subtracted from each point to set the zero reference of the trace to the center of the digitizer target.

Note: It is an error that 256 is subtracted. This error has been propagated throughout SASP versions 1 and 2. The value to be subtracted from the trace should be a function of the baseline offset, not a constant 256. This will be corrected in version 3 of SASP. This negates the baseline offset feature for the entire SASP package.

FIELD

MACRO-11 Written April 1976

Arguments:

Null flag:
- 1 The first character is a blank.
- 0 The field contains ASCII data.
- -1 The field is empty.
- -2 The field does not exist.

Field number

R0 The number of characters in the field
R1 The starting address of the field

Description:

Subroutine FIELD finds the requested field number in the terminal input buffer and counts the number of characters in the field. The null flag argument is set. All fields, except the first, start with the character control I (TAB) (11_8), and all, except the last, with the character NUL, a zero, since the buffer is always zero filled before input.

FLDCD

MACRO-11 Written April 1976
Modified April 1977

Arguments:

Null flag: 1 The first character is a blank
0 The field contains input.
-1 The field is empty.
-2 The field does not exist.

Field number
Address of a floating point variable

Description:

Subroutine FLDCD decodes a floating point number from the ASCII input in the selected field. The standard SASP terminal input conventions apply.

Input need not be in FORTRAN floating point input format. If there is no decimal point in the input, it is assumed to be to the right of the last digit or the last digit preceding the character E. The exponent field is limited to a maximum of two digits to be compatable with DEC FORTRAN. The numeric field is limited to a maximum of seven digits.

FLGPTS

MACRO-11 Written March 1976

Argument:

The address of the raw data array

Description:

Subroutine FLGPTS searches the raw digitizer data and flags those points that are either found or known to be bad by setting bit 12 in the horizontal value word. The following situations are flagged: repeated horizontal values, the last horizontal value read, and last horizontal value on the target. The flag is set by using the variable BADBIT, which is defined in the SYMDEF macro.

FLOTE

MACRO-11 Written April 1976

Argument:

R4

Description:

Subroutine FLOTE converts an integer to a floating point number with the same value. R4, used as a stack pointer, points to the bottom address of a stack that is of a minimum length of two words and that contains the integer. The floating point number is placed in the bottom two words of the stack, and R4 is reset to point to the first of these words.

FLOTE is designed to be used in-line with the floating point instructions on the PDP 11/40 by using a stack of at least four words.

FLPOP

MACRO-11 Written February 1977

Argument:

R4 as a stack pointer

Description:

Subroutine FLPOP is a multiple entry subroutine that handles floating point operations. This subroutine is normally referenced only through the macros FPA, FPS, FPC and FPE in macro library RRPMAC.MLB. A four-word stack for use by the subroutine must be provided by the calling program by invoking the FSTK macro in the same library.

FSCIN

MACRO-11 Written March 1977

File:

DK0:[100,100]SYSCON.DAT, DK1:[100,100]SssssO2.DAT
(ssss = shot number)

I/O Device:

TI:

COMMON Area:

SYSCON internal

Description:

Subroutine FSCIN reads the copy of SYSCON contained in the shot file (SssssO2.DAT) into the SYSCON COMMON area. The subroutine first reads the disc file SYSCON.DAT into this COMMON block and obtains the desired shot number from the information read in. Following this it opens the desired shot file and replaces the information in the COMMON area with the proper SYSCON from the shot file. All programs that use subroutine FSCIN must be built using internal storage for COMMON SYSCON instead of the SYSCON COMMON partition.

FXDCD

MACRO-11 Written date unknown
Modified April 1976

Arguments:

Null flag:
- 1 The first character is a blank.
- 0 The field contains ASCII input.
- -1 The field is empty.
- -2 The field does not exist.

Field number
Address of an integer variable

Description:

Subroutine FXDCD decodes an integer from the selected field. The standard SASP terminal input conventions apply. An odd number of minus signs causes a negative result. All other characters except integers are ignored.

Note: This includes the decimal point. Numbers containing a decimal point are not truncated; they are decoded as if the decimal point is not there; that is, 2.4 becomes 24 not 2.

GETBAS

MACRO-11 Written April 1976
Modified October 1976

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TI:, digitizers

Description:

Subroutine GETBAS obtains the baseline data from each digitizer, normalizes these data, and stores them in the disc file MAIN.DAT. Error conditions are flagged and listed on TI:. The normalized baseline is checked for proper position. The bloom parameter is calculated, checked, and stored. The knob readings are checked against the desired settings, and any discrepancies are flagged and listed. Baselines are stored in disc file MAIN.DAT for enabled digitizers only; other baseline data are untouched.

GETCAL

MACRO-11 Written April 1976
Modified November 1976

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TI:, digitizers

Description:

Subroutine GETCAL obtains the calibration data from each digitizer, normalizes these data, and stores them in the disc file MAIN.DAT. The baseline data for each digitizer are subtracted from the normalized calibration data before storage. The knob readings are checked against the desired settings. Error conditions are flagged and listed on TI:.

Calibration data are taken from enabled digitizers only; data areas within the disc file for disabled digitizers are untouched.

GETDAT

MACRO-11 Written April 1976
Modified November 1976

File:

DK1:[100,100]MAIN.DAT

I/O Devices:

TI:, digitizers

Description:

Subroutine GETDAT reads the raw shot data from the enabled digitizers and stores these data in the disc file MAIN.DAT. The only error condition is the no data error (15), which is caused by any other error being flagged for that digitizer.

GRAATC

FORTRAN Written July 1976
Modified October 1976

I/O Device:

TT0:

Arguments:

ISIZE Graph size parameter: 1, 2, or 3.

ITYPE
1 Graph final data
2 Graph calibration data
3 Graph baseline data
4 Graph raw data

N7912 Digitizer number

COMMON Area:

NORDAT

Description:

Subroutine GRAATC is used to graph data waveforms on the Tektronix R4010 terminal (TT0:). In current SASP usage, this subroutine is used only to graph the final data, using ITYPE = 1, ISIZE = 2. Actual plotting is done by using the Tektronix Terminal Control System software package.

GRABAS

FORTRAN Written July 1976
Modified October 1976

I/O Device:

TT0:

Arguments:

ISIZE Graph size parameter: 1, 2, or 3

N7912 Digitizer number

COMMON Area:

BASDAT

Description:

Subroutine GRABAS graphs the normalized baseline data on the Tektronix R4010 (TT0:) terminal. Actual plotting is done by using the Tektronix Terminal Control System software package.

GRACAL

FORTRAN Written July 1976
Modified October 1976

I/O Device:

TT0:

Arguments:

ISIZE Graph size parameter: 1, 2, or 3

N7912 Digitizer number

COMMON Area:

CALDAT

Description:

Subroutine GRACAL is used to graph the normalized calibration data on the Tektronix R4010 (TT0:) terminal. The actual plotting is done by using the Tektronix Terminal Control System software package.

GRAPHV

FORTRAN Written January 1977

Files:

DK1:[100,100]SssssO2.DAT, DK1:[100,100]VPLOT.BIN
(ssss = shot number)

COMMON Area:

NORDAT

Description:

Subroutine GRAPHV scales and plots the actual shot data, from COMMON NORDAT, for program SCAVP.

GRARAW

FORTRAN Written May 1976
Modified October 1976

I/O Device:

TT0:

Arguments:

ISIZE Graph size parameter: 1, 2, or 3

N7912 Digitizer number

COMMON Area:

RAWDAT

Description:

Subroutine GRARAW attempts to plot the raw digitizer waveforms on the Tektronix R4010 (TT0:) terminal. Certain types of "error" conditions can cause this subroutine to hang. The data points associated with these "errors" are flagged out of the normalized data; however, this routine attempts to plot everything that was stored in the digitizer memory. An asynchronous trap (AST) has been added to the program RAWCPY to enable the operator to manually advance to the next data point set by typing an "escape" character on TT1: when subroutine GRARAW hangs.

GRASCA

FORTRAN Written May 1976
Modified October 1976

I/O Device:

TT0:

Arguments:

N7912 Current digitizer number

YMAX Vertical scale factor for annotation

N Exponent of 10 for vertical scale factor

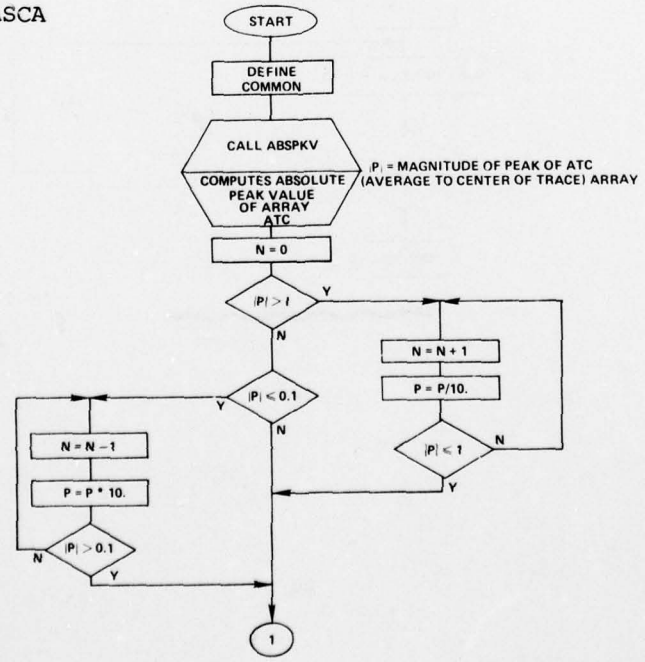
COMMON Areas:

SYSCON partition, NORDAT, PRBCAL, PARAM

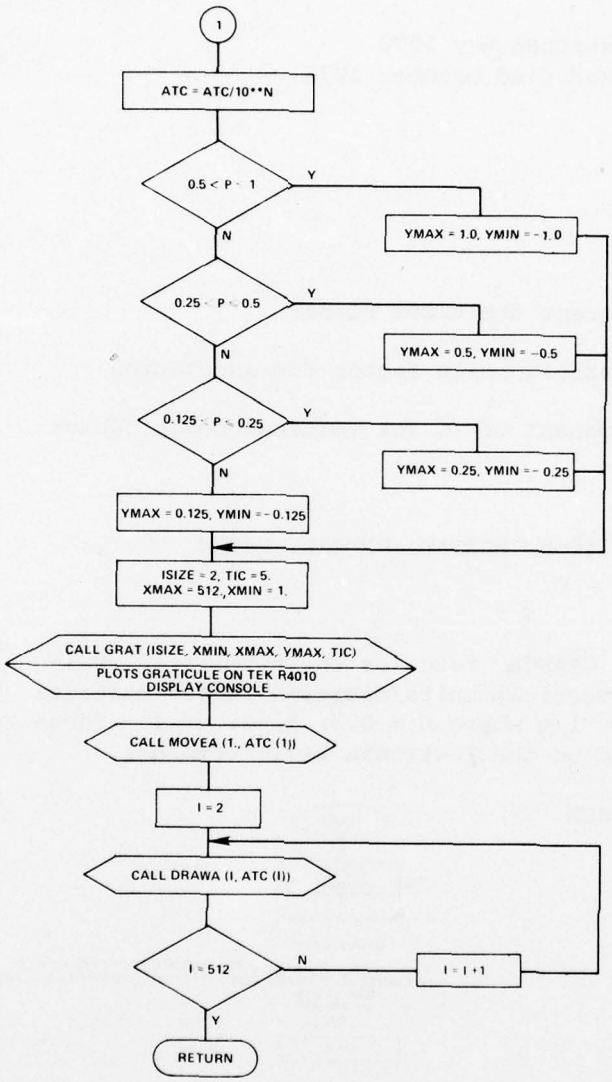
Description:

Subroutine GRASCA rescales the normalized scaled data arrays to adjust the vertical units/division factor mantissa value to a value of the form 1/n where n = 0.5, 1, 2, or 4. These rescaled data are then plotted on the Tektronix R4010 terminal.

Flowchart: GRASCA



Flowchart: GRASCA (Cont'd)



GRAT

FORTRAN Written April 1976

MACRO-11 Written August 1976
Modified January 1977

Arguments:

ISIZE Determiner of the size of the graph on the Tektronix R4010 terminal; allowed values are 1, 2, or 3. Currently, only the value of 2 is used in SASP. ISIZE is an integer number.

XMIN Minimum X coordinate value as a floating point number; currently, always zero

XMAX Maximum X coordinate value as a floating point number; currently, always 512

YMIN Minimum Y coordinate value, floating point

YMAX Maximum Y coordinate value, floating point

TIC Number of Y coordinate divisions on a vertical half axis. TIC has a value of 4 for all graphs, except the final scaled data graph where its value is 5. TIC is a floating point number. For all graphs except the final scaled data, YMIN = 256 and YMAX = 255.

Description:

Subroutine GRAT draws a rectangular frame with centered X and Y axes on the Tektronix R4010 terminal. The X axis is marked with tick marks to divide it into 10 divisions. The Y axis is marked with tick marks to divide it into either 8 or 10 divisions, depending on the value of TIC. GRAT also defines two windows for the Tektronix Terminal Control System, a software package for the Tektronix R4010 terminal. These windows define the upper and lower X and Y limits as floating point numbers (XMIN, XMAX, YMIN, YMAX) for user's units and as integers in absolute screen value units. These latter values are a function of the ISIZE argument.

IASCII

MACRO-11 Written April 1976
Modified March 1977

Arguments:

A one-to-four digit integer
First two ASCII equivalent characters
Second two ASCII equivalent characters

Description:

Subroutine IASCII converts the given integer into four ASCII characters. Leading zeros are preserved. This subroutine was modified to save and restore R1 and R2.

IFICKS

MACRO-11 Written April 1976

Argument:

R4 as stack pointer

Description:

Subroutine IFICKS is a MACRO-11 equivalent of the FORTRAN IFIX subroutine. R4 points to the first word of a two-word floating point number on a stack. The truncated integer equivalent replaces the second word of the floating point number, and the value of R4 is adjusted to point to this integer value. IFICKS is the converse of FLOTE.

INITLZ

MACRO-11 Written July 1976
Modified September 1976

Arguments:

NSAMP	Number of readings to take
NA	Address of data array for calorimeter A
NB	Address of data array for calorimeter B
NACNT	Actual number of readings taken on calorimeter A
NBCNT	Actual number of readings taken on calorimeter B
IERR	Error flag--nonzero values indicate device timeout

Description:

Subroutine INITLZ is the interface subroutine that controls the collection of calorimeter data through the DR-11K circuit board in the computer. Both the calorimeter output and the programmable clock values are read and stored in an asynchronous manner from the two calorimeters.

INPCSR

FORTRAN Written May 1976
Modified October 1976

I/O Device:

TT0:

COMMON Area:

PARAM

Description:

Subroutine INPCSR, a subprogram of program MARK, is used to obtain the X values (time) as rounded truncated integers for the points of interest from the shot data traces. This subroutine serves as an interface to the subroutine VCURSR in the Terminal Control System package provided by Tektronix. These values are obtained by the operator who sets the graphics X cursor to the desired point and types any character and then a carriage return. This operation is repeated three times. The PARAM COMMON block is written into the MAIN.DAT disc file by the calling program MARK.

INPUT

MACRO-11 Written May 1976

I/O Device:

TI:

Argument:

Null flag: -2 Immediate carriage return
0 Some data input

Description:

Subroutine INPUT allows the operator to type in a maximum of 80 characters on logical unit number (LUN)5. These characters are placed in an 80-character zero-filled buffer. If the character counter is zero, the null flag is set to -2; otherwise, it is set to zero. Those bytes not filled by input remain as zeros. LUN5 may be attached to any input device; it is assigned to TI: by the task builder.

INT

MACRO-11 Written May 1976

Arguments:

Address of data array to be integrated
Start of data point as FORTRAN subscript
Sweep rate of digitizer in nanoseconds

Description:

Subroutine INT performs a trapezoidal integration of the floating point data array whose address is provided as an argument, beginning at the start-of-data point. Δt is calculated in units of seconds, based on the sweep rate of the digitizer and the fixed spacing of the horizontal digitizer points. The data before the start of the data point are multiplied by Δt to be kept at the same relative magnitude as the integrated portion of the trace.

Algorithm:

$$Y'_n = Y_n \Delta t , \qquad n = 1, 2, \ldots, m - 1 ,$$

$$Y'_n = 0 , \qquad n = m ,$$

$$Y'_n = \left(Y_n + Y_{n+1}\right)\Delta t/2 , \qquad n = m + 1, m + 2, \ldots, 512 ,$$

$$\Delta t = \frac{1 \text{ point} \times \text{sweep rate (ns/div)}}{51.2 \text{ points/div} \times 10^9 \text{ ns/s}} ,$$

where

Y'_n = resulting vertical value (selected units),

Y_n = initial vertical value (selected units/second),

m = start of data subscript.

INTABL

MACRO-11 Written March 1977

I/O Devices:

Digitizers

Argument:

Number of digitizer controller boards, maximum 4

Description:

Subroutine INTABL enables the digitizer interrupts for the enabled digitizers by setting the enable bit in the controller status word.

The UNIBUS addresses used are

$$\text{ADRCB1} + \left(n \times 1000_8\right) , \quad n = 0, 1, \ldots, m - 1 ,$$

where

ADRCB1 = 164000_8 and is established by the SYMDEF macro,
m = number of controller boards.

INTDIG

MACRO-11 Written date unknown
Obtained from Naval Surface Weapons Center, White Oak, MD.

I/O Devices:

Digitizers

Description:

Subroutine INTDIG is an interrupt handler for the digitizers. The only action this subroutine takes is to lock the memory of the interrupting digitizer. This subroutine has four entry points, one for each digitizer controller board. These entry points are labeled as follows:

INSCB1:: board number one
INSCB2:: board number two
INSCB3:: board number three
INSCB4:: board number four

Each entry point is reentrant. The address of the interrupting digitizer is calculated from the address of the controller board and the device number in the controller status word.

INTRP

MACRO-11 Written April 1976

Argument:

Address of data array

Description:

Subroutine INTRP performs the interpolation step in the normalization process of the shot data array. Floating point arithmetic is used.

ISBASE

MACRO-11 Written April 1976

Argument:

Digitizer number

Description:

Subroutine ISBASE subtracts the baseline data and the constant 256 from the calibration trace data. This is a part of the normalization process of the calibration data traces. Integer arithmetic is used.

LSTERR

MACRO-11 Written May 1976

I/O Device:

TI:

Arguments:

Error word
Digitizer number or zero
Zero or channel number

Description:

Subroutine LSTERR lists either a digitizer or a channel error. If the second argument is nonzero, a digitizer error is listed; otherwise, a channel error is listed. The error message includes the BEL character (7) to alert the operator to the error condition.

MARKIT

FORTRAN Written January 1977

File:

DK1:[100,100]VPLOT.BIN

COMMON Area:

PARAM

Description:

Subroutine MARKIT is used to add the tick marks showing the peak of the fidu pulse, the start of data, and time of the first peak of interest to the graphs produced by program SCAVP.

MINMAX

MACRO-11 Written April 1976

Arguments:

Address of integer array
Array size
Maximum value
FORTRAN subscript for maximum value
Minimum value
FORTRAN subscript for minimum value

Description:

Subroutine MINMAX scans the input array and locates the maximum and minimum signed values and their positions within the array. The positions are then converted to FORTRAN subscripts.

MRKCUR

FORTRAN Written May 1976
Modified October 1976, March 1977

I/O Device:

TTO:

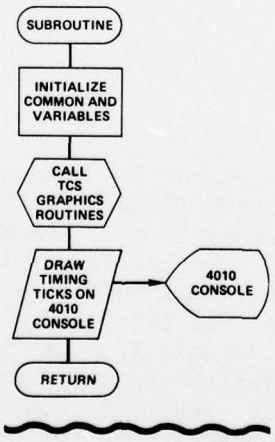
COMMON Area:

PARAM

Description:

Subroutine MRKCUR is used by programs MARK and SCACPY to annotate the graphs with three short tick marks just below the top of the graph to indicate the times chosen by the operator for the peak of the fidu pulse, the start of data, and the time of the first peak of interest. Actual plotting is done by using the Tektronix Terminal Control System software package.

Flowchart: MRKCUR



NSCALE

FORTRAN Written October 1976

Arguments:

A Number to be scaled
I Scaling exponent

Description:

Subroutine NSCALE adjusts A to a value between 1. and 10. and sets the value of I so that

$$\text{old A} = \text{new A} \times 10^{I} .$$

PAGE

FORTRAN Written June 1976

I/O Device:

TI:

Description:

Subroutine PAGE either erases the screen of the Tektronix R4010 terminal or causes the LA36 (DECwriter II) to space up eight lines, depending on which terminal is TI:. PAGE issues a GETLUN executive call to determine which terminal is in use. This determination is made by checking the terminal buffer size. If the buffer size is 132, the terminal is the LA36, and a FORTRAN WRITE statement is issued with a FORMAT consisting of a "1"; otherwise, the ERASE subroutine of the Tektronix Terminal Control System (TCS) software package is called. This subroutine should not be confused with the subroutine of the same name in the TCS package.

AD-A052 767 HARRY DIAMOND LABS ADELPHI MD F/G 9/2
SKYNET APPLICATIONS SOFTWARE PACKAGE (SASP) PROGRAMMERS' HANDBO--ETC(U)
FEB 78 R PUTTCAMP
UNCLASSIFIED HDL-TR-1844 NL

2 OF 2
AD A052767

END
DATE FILMED
5 -78
DDC

PLTSF

FORTRAN Written April 1976
Modified October 1976

I/O Device:

TT0:

COMMON Area:

SYSCON partition

Description:

Subroutine PLTSF is used to annotate the raw data graphs produced by program GRARAW. The vertical and horizontal scale factors and the digitizer number are added to the graph, as is the word "RAW".

PRBREF

MACRO-11 Written May 1976

File:

DK0:[100,100]PRBCAL.DAT

Argument:

Entry point PRDENT: probe identification (ASCII)
Other entry points: none

Description:

PRBREF is a multiple entry point subroutine used by program PRB for all references to the disc file PRBREF.DAT. This file is opened and closed for each call to the subroutine. Entry point functions are these:

PINIT Initialize the last record pointer and clear the current record pointer.

PNEW Create a new disc file, with the next higher version number, containing only an end-of-file record.

PRDENT Search through the disc file for an entry matching the device identification in the argument. A record consisting of all minus ones signifies that no matching record was found.

PRDNEX Get the next record from the disc file.

PRESET Clear the current record pointer.

PWRADD Append a new record to the end of the disc file.

PWRENT Rewrite and, hence, update the current disc file record.

PRBSCH

MACRO-11 Written May 1976
Modified March 1977

File:

DK0:[100,100]PRBCAL.DAT

I/O Device:

TI:

Argument:

Probe identification (ASCII)

Description:

Subroutine PRBSCH searches the disc file PRBCAL.DAT for the given probe identification. If the probe is not found, an end-of-file message is listed on TI:. The disc file is opened and closed with each call to the subroutine.

PRICLR

MACRO-11 Written July 1976

I/O Device:

LP0:

Arguments:

τ_o, clock value at time that simulator fired
(six dummy arguments)
Sample count for channel A calorimeter
Sample count for channel B calorimeter

Description:

Subroutine PRICLR prints the raw calorimeter data on the line printer. These data are printed as five columns of 20 time-amplitude pairs with the time values first. Time values are in units of 10 μs; calorimeter values are in units of 1.95 μV. One hundred entries are printed for each calorimeter, regardless of the actual number of samples that were collected, but all entries beyond the end of actual data are cleared. The value of τ_o is subtracted from all of the time entries.

QKELIM

MACRO-11 Written April 1976
Modified November 1976

Argument:

Address of an integer array of length 512

Description:

Subroutine QKELIM performs the noise point elimination step of the digitizer data normalization process for the baseline and calibration data. Integer arithmetic is used. This subroutine is analogous to the floating point subroutine ELIMPT.

QKLNTP

MACRO-11 Written April 1976
Modified November 1976

Argument:

Address of an integer array of length 512

Description:

Subroutine QKLNTP performs the interpolation step of the normalization process for the baseline and calibration data. Integer arithmetic is used. This subroutine is analogous to the floating point routine INTRP.

RAWPLT

MACRO-11 Written May 1976
Modified January 1977

COMMON Areas:

HPTR, RAWDAT, IHPTR

Description:

RAWPLT is a subroutine of program GRARAW. It is used to condition the raw data array and to generate an array of pointers to the vertical information within the raw data array. The raw data are in a 2046-word array in COMMON block HPTR. Each word of this array is either a horizontal or a vertical value and is flagged as such by the digitizer from which the data were obtained. Subroutine RAWPLT replaces each horizontal value with the count of vertical values for that horizontal value and places a pointer to the count value in the array IHPTR. Repeated horizontal values are not processed. The array IHPTR is arranged so that the pointers will produce a graph in numeric sequence from 1 to 512 on the horizontal axis.

RDIG

MACRO-11 Written April 1976

Arguments:

Digitizer UNIBUS address
Error word

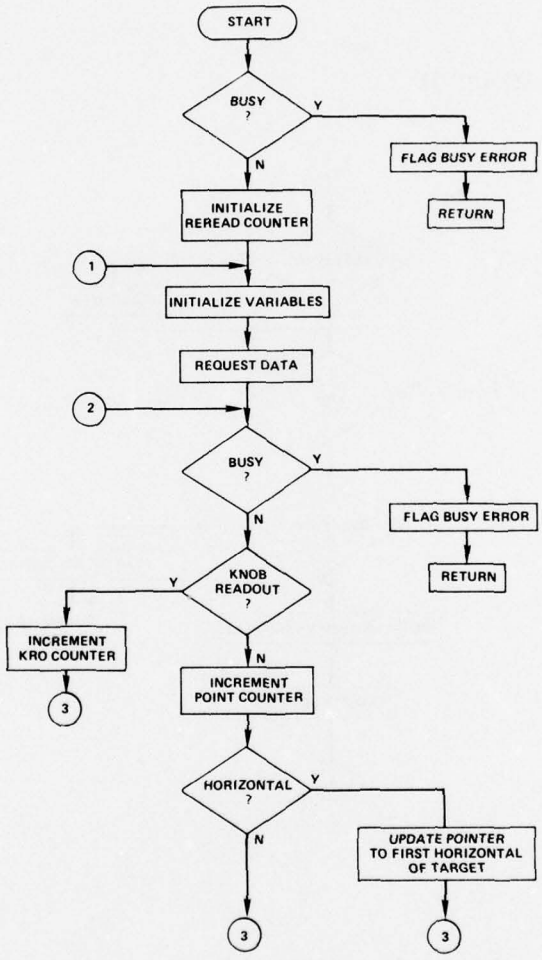
Description:

Subroutine RDIG reads and verifies the raw data from the specified digitizer. To verify the data, they are reread, and the two sets of values are compared. During the first reading, the number of data points is counted, and this value is stored; a pointer to the first h izontal on the target is set. If during the verification process more than MISMAX errors are found, the entire reading and verifying process is repeated. This repetition can occur TRYMAX times, at which point an error code of 7 is generated. MISMAX and TRYMAX are defined in the SYMDEF macro.

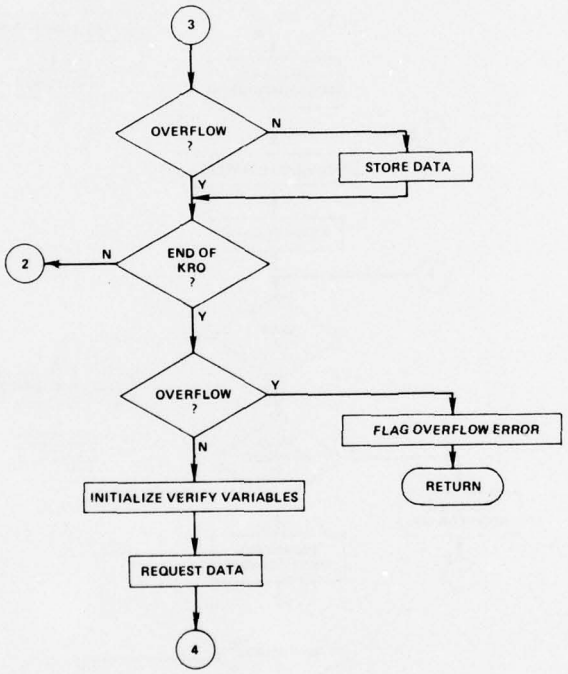
The maximum number of points that will be stored is RAWMAX; additional points are read, but not stored. Following the data reading, the knob readout information is read and stored. If the number of data points exceeds the value of RAWMAX, an error code of 2 is generated. If there are less than RAWMIN points, an error code of 3 is generated. RAWMAX and RAWMIN are also defined by the SYMDEF macro. Their values are based on the concept of three data points for each horizontal point on the digitizer screen (that is, the horizontal value and two vertical values). Therefore, in the ideal situation, there would be 1536 data points. Any raw data trace having a count value significantly different from 1536 will be difficult to normalize.

The data points and knob readout data are stored in the same order as they are read. Since the read gun in the digitizer begins in an arbitrary location on the screen and wraps around, the first horizontal that is read is rarely the first horizontal on the target.

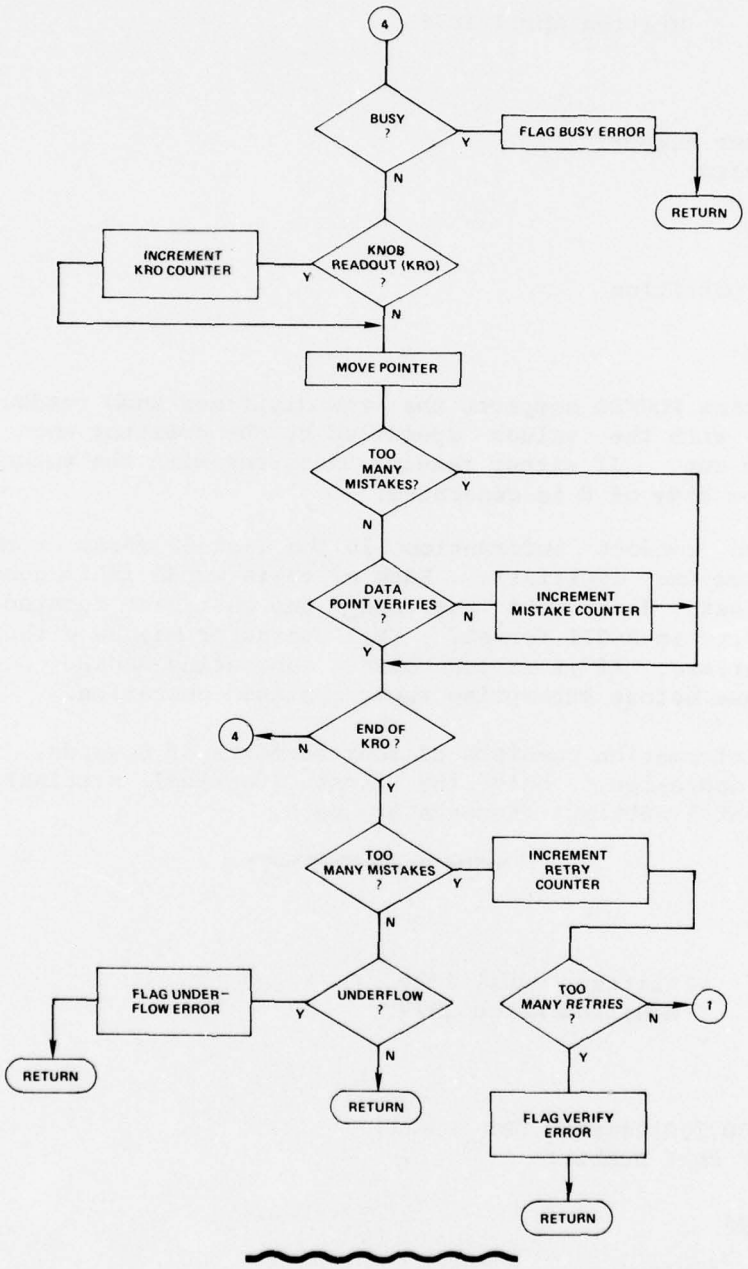
Flowchart: RDIG



Flowchart: RDIG (Cont'd)



Flowchart: RDIG (Cont'd)



RDUKRO

MACRO-11 Written April 1976

Arguments:

Digitizer number
Error word

COMMON Area:

SYSCON partition

Description:

Subroutine RDUKRO compares the raw digitizer knob readout character (ASCII) with the values specified by the operator when the program LOG was run. If either reading disagrees with the value in SYSCON, an error code of 8 is generated.

The knob readout information is the last 32 words of the raw data read from the digitizer. Each of these words is flagged by having bit 15 set. Each word has only one character located in the low order byte in ASCII format. This character may be either uppercase or lowercase. If it is lowercase, subroutine RDUKRO converts it to uppercase before attempting the comparison operation.

This information consists of four segments of 8 words. In normal STARS operation, only the first (vertical setting) and last (horizontal setting) segments are used.

SAVCLR

MACRO-11 Written August 1976
Modified March 1977

File:

DK1:[100,100]CssssO2.DAT
(ssss = shot number)

COMMON Area:

SYSCON partition

Description:

Subroutine SAVCLR creates and writes the calorimeter data file CssssO2.DAT. This file is written if and only if calorimeter data exist.

SCADAT

MACRO-11 Written May 1976
Modified May 1977

File:

DK1:[100,100]MAIN.DAT

I/O Device:

TI:

Arguments:

Digitizer number
Error word

COMMON Area:

SYSCON partition

Description:

Subroutine SCADAT normalizes and scales the raw shot data and stores the result in disc file MAIN.DAT for the enabled digitizers. Baseline data are subtracted during the normalization process. The scale factors are obtained from COMMON SYSCON. The knob readout information is checked and, if the information is found to be incorrect, an error code of 8 is generated. If the error is generated, that digitizer is disabled, but the scaled data are still stored in the disc file.

The algorithms used for data scaling are described in the writeup for program SCALE.

SCGEN

MACRO-11 Written May 1976
Modified January 1977

File:

DK0:[100,100]SYSCON.DAT

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Subroutine SCGEN creates a new SYSCON first in the COMMON partition and then on disc 0 (DK0:). The disc file has the next higher version number. The value of NSCBLK is used to allocate the necessary disc blocks for this file. NSCBLK is defined in the SYMDEF macro; it is currently set with a value of 5. Disc errors are listed on TI:.

SCIO

MACRO-11 Written April 1976
Modified March 1977

File:

DK0:[100,100]SYSCON.DAT

I/O Device:

TI:

COMMON Area:

SYSCON partition or internal exclusively

Description:

Subroutine SCIO has two entry points:

SCIN — Causes the disc file SYSCON.DAT to be read to the SYSCON COMMON area

SCOUT — Causes the SYSCON COMMON area to be written to the current version of the disc file SYSCON.DAT

In Version 2 of the SASP, SCOUT is used only to write the SYSCON partition to disc. The number of disc blocks read or written is the value of the variable NSCBLK, which is defined in the SYMDEF macro.

SCMAIN

MACRO-11 — Written April 1976
Modified January, March and May 1977

Files:

DK1:[100,100]MAIN.DAT, DK1:[100,100]SsssS02.DAT
(ssss = shot number)

I/O Device:

TI:

COMMON Area:

SYSCON partition

Description:

Subroutine SCMAIN writes the contents of COMMON SYSCON into the first NSCBLK blocks of disc file MAIN.DAT and then renames this disc file to SsssS02.DAT. The variable NSCBLK is defined in the SYMDEF macro.

SETVEC

MACRO-11 Written March 1976

I/O Devices:

Digitizers

COMMON Area:

SYSCON partition

Description:

Subroutine SETVEC establishes the digitizer interrupt vectors and priorities. The addresses set into the interrupt vectors are the entry points of the subroutine INTDIG. The priority is the value of variable PRIDIG, which is defined in the SYMDEF macro.

STCDAT

MACRO-11 Written May 1976

COMMON Areas:

SYSCON partition, TIME

Description:

Subroutine STCDAT transfers the six most significant words of the eight returned by the GTIM$ system macro into the date and time storage locations in COMMON SYSCON. The GTIM$ macro is invoked at the time of the trigger from the OWL II simulator and records the actual time and date of the shot. These data are stored in COMMON TIME by the GTIM$ macro.

SUBASE

MACRO-11 Written April 1976

COMMON Areas:

NORDAT, BASDAT

Description:

Subroutine SUBASE subtracts the baseline data and the number 256 from the shot data. End gaps in the data array are set to zero. These are the last three steps in the normalization process for the shot data. Each baseline data point (integer) has the number 256 added to it; then it is converted to a floating point number and subtracted from the corresponding data point in the shot data array. This is the floating point analog of subroutine ISBASE.

UCOUT

MACRO-11 Written May 1976
Modified March and May 1977

File:

DK1:[100,100]Sssss02.DAT
(ssss = shot number)

COMMON Area:

SYSCON partition

Description:

Subroutine UCOUT writes the user comments to the disc file Sssss02.DAT. The shot number and simulator code (02) are obtained from the SYSCON COMMON block. The user comments are stored in the channel entry array (ICHAN) of SYSCON COMMON. The contents of ICHAN are saved and restored by the calling program. There is one comment for each digitizer in the system.

VGRAT

FORTRAN Written January 1977

File:

DK1:[100,100]VPLOT.BIN

Description:

Subroutine VGRAT draws a rectangular frame with centered X and Y axes for the final scaled data plots produced by program SCAVP. Both axes are marked with tick marks to divide the axes into 10 divisions.

XCHDRI

MACRO-11 Written May 1976

File:

DK0:[100,100]XCHCAL.DAT

COMMON Area:

XCHHDR

Description:

Subroutine XCHDRI opens disc file XCHCAL.DAT, reads in the header section of the channel data (the first three records), and then closes the file.

XCHREF

MACRO-11 Written May 1976
Modified March 1977

File:

DK0:[100,100]XCHCAL.DAT

I/O Device:

TI:

Arguments:

Entry point:	XNEW	Number of channels
	XRDENT	Channel number
	XWRENT	Channel number

COMMON Areas:

XCHHDR, XCHCAL

Description:

XCHREF is a multiple entry point subroutine using a common file descriptor block for the disc file XCHCAL.DAT. It handles all disc references for the program XCH. Disc file XCHCAL.DAT is opened and closed with each call to the package. The function of each entry point is described below:

XNEW Creates a new disc file with the next higher version number and large enough to hold the information required for the number of channels given in the argument

XRDENT Reads the entries for the given channel number into COMMON XCHCAL

XRDHDR Reads the three records of header information into COMMON XCHHDR

XWRENT Writes the entries for the channel number given in the argument from COMMON XCHCAL to the disc file

XWRHDR Writes the header information from COMMON XCHHDR to the disc file

XCHSCH

MACRO-11 Written May 1976
Modified March 1977

File:

DK0:[100,100]XCHCAL.DAT

I/O Device:

TI:

Argument:

Channel number

COMMON Areas:

XCHCAL

Description:

Subroutine *XCHSCH reads the entry in disc file* XCHCAL.DAT for the given channel number into COMMON XCHCAL. The disc file is opened and closed with each call to XCHSCH. If the requested channel information is not present, an error message is listed on TI:.

XMIT

MACRO-11 Written April 1976
Modified January and March 1977

I/O Devices:

TI:, attenuator control unit

Argument:

MODE 0 On
1 Off

COMMON Area:

SYSCON partition

Description:

Subroutine XMIT was written to control the operation of the fiber optic transmitters and to cause the setting of the remote attenuators in those transmitters for programs DATA and DATAPC. Commands are sent to enabled channels only. An attenuator verification error is flagged and listed as a channel error 2, the channel is disabled, and the transmitter is turned off. All associated digitizers on that channel are disabled.

This subroutine is not currently used in the SASP package; subroutine XMTSPC is used, instead.

XMIT Source File: XMTSPC.MAC

MACRO-11 Written April 1976
Modified January and March 1977

I/O Devices:

TI:, attenuator control unit

Argument:

MODE 0 On
1 Off

COMMON Area:

SYSCON partition

Description:

Subroutine XMIT controls transmitter turn on, attenuator set, attenuator verification and reverification, and transmitter turn-off functions for programs DATAPC and CONDAT. Commands are sent to enabled channels only. Three attempts are made to obtain a correct verification of the attenuator setting; if the verification fails on the third attempt, the transmitter is left on and a verification error for that channel (error 2) is listed on TI:. Neither the channel nor the associated digitizers are flagged out. Reverification of the attenuator setting is made in program CONDAT before the transmitters are turned off; any errors found are listed on TI:.

The object file for this subroutine is XMTSPC.OBJ, and it must be listed by that name in all inputs to the task builder.

.RSTR

MACRO-11 Written July 1976

Description:

Subroutine .RSTR restores general registers R0 through R5, in reverse numerical order, from the program stack. This subroutine is the inverse of subroutine .SAVE.

.SAVE

MACRO-11 Written July 1977

Description:

Subroutine .SAVE stores the general registers R0 through R5, in ascending numerical order, on the program stack. This subroutine is the inverse of subroutine .RSTR.

APPENDIX A.--SUBROUTINE CROSS-REFERENCE LIST

This appendix lists the subroutines, where they are stored, which other subroutines they call, and which other ones call them on the SKYNET Applications Software Package.

Name (entry points)	Library	Subroutine (entry point) called	Called by
ABSPKV	None	None	GRASCA
ANOCLR	None	None	PLTCLR (program)
ANOMRK	None	MOVABS ANMODE	MARK (program)
ANOSCA	None	MOVABS ANMODE	SCACPY (program)
ANOT8	None	None	SCAVP (program)
ANSWER	INPUT	ASDCD INPUT	Many
ASCBIN	None	None	SCAVP (program)
ASDCD	INPUT	FIELD	Many
ASTSC	None	ASTSET ASTCLR	RAWCPY (program)
ATNREF (AINIT) (ANEW) (ARDENT) (ARDNEX) (ARESET) (AWRADD) (AWRENT)	None	None	ATN (program)
ATNSCH	None	None	Many
ATTEN	None	None	CAL (program) CONDAT (program)
BASATC	Normal	None	GETBAS

APPENDIX A

Name (entry points)	Library	Subroutine (entry point) called	Called by
BUSY	HANDLR	None	RDIG
CALATC	NORMAL	None	GETCAL
CALCSF	None	ATNSCH FLOTE PRBSCH XCHSCH	SCALE (program)
CALIB	None	ATTEN (ATTEN) CHNERR LSTERR .RSTR .SAVE	CAL (program)
CALOR	None	None	CONDAT (program)
CALPLT	None	None	PLTCAL (program)
CHACNT	None	None	SCAVP (program)
CHKTRG	HANDLR	DIGERR LSTERR .RSTR .SAVE	BASE (program) CAL (program) DATAPC (program)
CHNERR	ERROR	DISABL (DISDIG)	Many
CLRCBD	HANDLR	None	Many
CMDDIG	HANDLR	DIGERR LSTERR .RSTR .SAVE	Many
DATATC	NORMAL	FLOTE	SCADAT
DATFIO (CLOSES) (OPENS) (READB) (READR) (WRITEB) (WRITER)	None	None	Many

Name (entry points)	Library	Subroutine (entry point) called	Called by
DCDBIT	ERROR	None	FLAG (program) SUMERR (program)
DIGERR	ERROR	DISABL (DISCHN)	Many
DISABL (DISCHN) (DISDIG)	ERROR	None	CHNERR DIGERR
DSKERR	ERROR	None	Many
ELIMPT	NORMAL	IFICKS	SCADAT
ERRNUM	ERROR	None	LSTERR
EXTRAP	NORMAL	None	GETBAS
FIELD	INPUT	None	ASDCD FLDCD FXDCD
FLDCD	INPUT	FIELD FLOTE	Many
FLGPTS	HANDLR	None	GETBAS GETCAL GETDAT
FLOTE	INPUT	None	Many
FLPOP	None	None	Many
FSCIN	None	None	Many
FXDCD	INPUT	FIELD	Many
GETBAS	None	BASATC DIGERR EXTRAP FLGPTS LSTERR MINMAX QKELIM QKLNTP RDIG RDUKRO	BASE (program)

APPENDIX A

Name (entry points)	Library	Subroutine (entry point) called	Called by
GETCAL	None	CALATC DIGERR FLGPTS ISBASE LSTERR QKELIM QKLNTP RDIG RDUKRO	CAL (program)
GETDAT	None	DIGERR FLGPTS LSTERR RDIG	DATAPC (program)
GRAATC	None	GRAT MOVEA DRAWA	MARK (program)
GRABAS	None	GRAT MOVEA DRAWA	CHKBAS (program)
GRACAL	None	GRAT MOVEA DRAWA	CHKCAL (program)
GRAPHV	None	None	SCAVP (program)
GRARAW	None	RAWPLT GRAT POINTA	RAWCPY (program)
GRASCA	None	GRAT MOVEA DRAWA ABSPKV	SCACPY (program)
GRAT	None	TWINDO DWINDO MOVEA DRAWA MOVER DRAWR INITT	GRAATC GRABAS GRACAL GRARAW GRASCA

Name (entry points)	Library	Subroutine (entry point) called	Called by
IASCII	ERROR	None	LSTERR SHOTNO (program)
IFICKS	INPUT	None	Many
INITLZ	None	None	CONDAT (program)
INPCSR	None	SETBUF VCURSR	MARK (program)
INPUT	INPUT	None	Many
INT	None	FLOTE	SCACPY (program)
INTABL	HANDLR	None	BASE (program) CAL (program) DATAPC (program)
INTDIG (INSCB1) (INSCB2) (INSCB3) (INSCB4)	HANDLR	None	SETVEC Tektronix R 7912 interrupt
INTRP	NORMAL	FLOTE	SCADAT
ISBASE	NORMAL	None	GETCAL
LSTERR	ERROR	ERNUM IASCII	Many
MARKIT	None	None	SCAVP (program)
MINMAX	None	None	GETBAS CHKCAL (program)
MRKCUR	None	MOVABS DRWREL	MARK (program) SCACPY (program)
NSCALE	None	None	SCAVP (program)
PAGE	None	ANMODE INITT	BLMCHK (program) ERASE (program) FLAG (program) LOG (program)

APPENDIX A

Name (entry points)	Library	Subroutine (entry point) called	Called by
PLTSF	None	MOVABS ANMODE	RAWCPY (program)
PRBREF (PINIT) (PNEW) (PRDENT) (PRDNEX) (PRESET) (PWRADD) (PWRENT)	None	None	PRB (program)
PRBSCH	None	None	Many
PRICLR	None	None	DATAPC (program)
QKELIM	NORMAL	None	GETBAS GETCAL
QKLNTP	NORMAL	None	GETBAS GETCAL
RAWPLT	None	None	RAWCPY (program)
RDIG	HANDLR	BUSY	GETBAS GETCAL GETDAT
RDUKRO	None	None	GETBAS GETCAL SCADAT
SAVCLR	None	None	CONDAT (program)
SCADAT	None	DATATC DIGERR ELIMPT FLOTE LSTERR INTRP RDUKRO SUBASE	SCALE (program)
SCGEN	None	None	CONGEN (program)

Name (entry points)	Library	Subroutine (entry point) called	Called by
SCIO	None	None	Many
SCMAIN	None	None	TABIN (program)
SETVEC	HANDLR	INTDIG (INSCB1) (INSCB2) (INSCB3) (INSCB4)	BASE (program) CAL (program) DATAPC (program)
STCDAT	None	None	DATAPC (program)
SUBASE	NORMAL	FLOTE	SCADAT
UCOUT	None	None	USRCOM (program)
VGRAT	None	None	SCAVPY (program)
XCHDRI	None	None	Many
XCHREF (XNEW) (XRDENT) (XRDHDR) (XWRENT) (XWRHDR)	None	None	XCH (program)
XCHSCH	None	None	Many
XMIT	None	ATTEN (ATTEN) CHNERR LSTERR .RSTR .SAVE	DATAPC (program)
.RSTR	ERROR	None	Many
.SAVE	ERROR	None	Many

APPENDIX B.--STANDARDIZED COMMON AREAS

This appendix lists COMMON areas and their variables used in the SKYNET Applications Software Package.

Area	Definition	Variables
ATNCAL	ATNCAL.DAT entry	IDA(2), GAIN, DLAY, MODL(4), IMFR(4), ISP3(2)
BASDAT	baseline trace	IBASE (512)
CALDAT	calibration trace	ICAL (512)
LINE	terminal input buffer	INBUF (40)
NORDAT	scaled data trace	ATC (512)
PARAM	parameter entry of shot file	IEFLG, ITFIDU, ITSDTA, ITPEAK, ITEND, ITCAL, TFST, PEAK, TPEAK, AREA, CALCOM(6), RAWCOM(6), SCACOM(6), ISPRE (14)
PRBCAL	PRBCAL.DAT entry	ID(2), TF, DLY, IUNIT(4), IFLG, IBLN, MT, ISP1, MDL(4), IMFG(4), ICON(4), PAR, ISP2(4)
RAWDAT	raw digitizer data	IHPT, NPTS, IRAW(2046)
SYSCON	copy of SYSCON.DAT	IHDR(80), IDIG(10,20), ICHAN(32,30) or IDAT(3), ITIM(3), IASC(2), ISHN, NDIG, NCB, NCHAN, IVBN(6), ISIM, IWIRE, CHARGE, TVAC, VDPV, CDPV, ICOM(15), NBLKS, CALOR1, CALOR2, NSAMP1, NSAMP2, ICLERR, IFLC, AD, BD, FLT, IDBT, IDBC, ISPARE(20), IDIG(12,20), ICHAN(32,30)
TIME	time and date of trigger	ITM(8)
XCHCAL	XCHCAL.DAT entry	IXMT, IFBR, IREC, ISP4, DELAY, CALLEV
XCHHDR	XCHCAL.DAT header	NCHN, ISP6, DT1, DTR1, DTR2, DTF, DTV, BLN(3), ISP7(6)

APPENDIX B

Area	Variables	Definition
ATNCAL	DLAY	device delay (nanoseconds)
	GAIN	device gain (decibels)
	IDA	device identification (ID)
	IMFR	manufacturer's serial number
	ISP3	spare
	MODL	model
BASDAT	IBASE	baseline trace
CALDAT	ICAL	calibration trace
LINE	INBUF	terminal input buffer
NORDAT	ATC	scaled data trace
PARAM	AREA	area under data trace
	CALCOM	comment on calibration trace
	IEFLG	flag
	ITCAL	FORTRAN subscript for peak of calibration trace
	ITEND	FORTRAN subscript for end of data trace
	ITFIDU	FORTRAN subscript for peak of fiducial (fidu) in data trace
	ITPEAK	FORTRAN subscript for peak of interest in data trace
	ITSDTA	FORTRAN subscript for start of data in data trace
	ISPRE	spare
	PEAK	peak of interest in data trace
	RAWCOM	comment on raw data trace
	SCACOM	comment on scaled data trace
	TFST	time from source to start of data
	TPEAK	time from start of data to peak of interest
PRBCAL	DLY	probe delay (nanoseconds)
	IBLN	balun number
	ICON	connector
	ID	probe ID
	IFLG	flag
	IMFG	manufacturer's serial number
	ISP1	spare
	ISP2	spare
	IUNIT	units for scaled data
	MDL	model
	MT	measurement type
	PAR	parameter
	TF	transfer function (decibels)

Area	Variables	Definition
RAWDAT	IHPT	FORTRAN subscript for first horizontal in raw data trace
	IRAW	raw data trace followed by knob readout characters
	NPTS	number of data points in raw data trace
SYSCON	ICHAN	channel entries
	IDIG	digitizer entries
	IHDR	header
	or	
	AD	uncertainty value for calorimeter A
	BD	uncertainty value for calorimeter B
	CALOR1	result for calorimeter channel A
	CALOR2	result for calorimeter channel B
	CDPV	current diode peak value
	CHARGE	simulator charge level or pulser output level
	FLT	filter thickness in inches
	IASC	American Standard Code for Information Interchange (ASCII) shot number
	ICHAN	channel entries
	ICLERR	calorimeter error flag
	ICOM	simulator comment
	IDAT	trigger date
	IDBC	debris shield code
	IDBT	number of thicknesses of debris shield
	IDIG	digitizer entries
	IFLC	filter code
	ISHN	integer shot number
	ISIM	simulator or pulser code
	ISPARE	spare
	ITIM	trigger time
	IVBN	virtual block numbers for segments of shot file
	IWIRE	wire type or configuration code
	NBLKS	number of blocks in shot file
	NCB	number of digitizer controller cards
	NCHAN	number of channels
	NDIG	number of digitizers
	NSAMP1	number of samples taken on calorimeter channel A
	NSAMP2	number of samples taken on calorimeter channel B
	TVAC	tank vacuum
	VDPV	voltage diode peak value

APPENDIX B

Area	Variables	Definition
TIME	ITM	trigger time and date
XCHCAL	CALLEV	calibration pulse reference level
	DELAY	transmission channel delay
	IFBR	fiber number
	IREC	receiver number
	ISP4	spare
	IXMT	transmitter address number
XCHHDR	BLN	balun insertion gain (decibels)
	DTF	fidu path delay (Δt_{fidu}) (nanoseconds)
	DTR1	first part of trigger path delay ($\Delta t_{trig\ 1}$) (nanoseconds)
	DTR2	second part of trigger path delay ($\Delta t_{trig\ 2}$) (nanoseconds)
	DTV	vertical plug-in delay
	DT1	source to XRD transit time (nanoseconds)
	ISP6	spare
	ISP7	spare
	NCHN	number of channels

APPENDIX C.--REMARKS ON SYSCON

Part or all of the information contained in SYSCON is needed by almost every program in the SKYNET Applications Software Package (SASP). The exceptions are ATN, PLTCLR, PRB and XCH. In version 1 of SASP, SYSCON was established as an internally contained COMMON block in the main program of each task. The analogous construct of a SYSCON PSECT was used in those programs in the MACRO-11 language. This required each program to read the disc file SYSCON.DAT into memory at the start of execution and to write the information back to the disc file if any changes or additions were made at the end of execution. This information was written by calls to entry points SCIN and SCOUT in subroutine SCIO. Although the file is short, only five disc blocks, this method of operation expended a sizable amount of time in disc reads and writes during the course of a day's operation.

Once the memory management board was installed in the computer and the full 76K of memory could be utilized, it became feasible to place SYSCON in a COMMON partition and leave it in memory. However, at that time, all of the privileged programs were set to run in a 12K partition. This size made it impossible to have the programs access the COMMON partition since only three of the memory management registers are available to a privileged program. Each register can address 4K of memory. With the exception of program DATAPC, all of the privileged programs were modified to run in 8K of memory in January 1977. DATAPC was split into three programs--DATAPC, CONDAT and MORDAT--in March 1977 to achieve a set of programs, each of which would fit in 8K of memory. The SYSCON partition was established in January 1977, and the programs were all retask built to use the partition at that time. The programs SAVCON and GETCON were written to save and restore this partition from disc. SAVCON had to be run before DATAPC and GETCON had to be run afterwards since DATAPC still read SYSCON from the disc and restored it. The calls to SCIO were removed from all of the other programs, except for CONGEN, which generates SYSCON, and TABIN, which copies the partition into the shot file and updates the disc version of SYSCON.

An inherent error in SASP began to cause real problems during and after the January 1977 test. Although a copy of the exact SYSCON for each shot was a part of the data file for that shot, none of the programs referenced that version of SYSCON; they all used either the disc file or the COMMON partition. This error was known, but only when it became necessary to reproduce old data were the full effects of this error demonstrated. One could get to the data, but not to SYSCON. Therefore, in March 1977, a new subroutine, FSCIN, was added to the package to allow access to the copy of SYSCON in the shot file. The method of accessing these shot files was and still is through the shot number. All programs run in the data sequence after program TABIN actually reference the shot file, rather than MAIN.DAT, and they get to

the shot file through the shot number stored in SYSCON. These programs are SCACPY, SCAVP, TABLES, SUMERR, and RECCAL. The concept of overwriting the master copy of SYSCON in the partition with "old" data obviously could not be considered. But the operating system and the task builder do not allow a program to reference two COMMON areas with the same name. Therein lay the problem. The solution was to use an internal SYSCON COMMON block in this latter set of programs, have them get the shot number from the disc copy of SYSCON, and then read the copy of SYSCON in the shot file into this internal COMMON area. This solution was implemented in March 1977 and used through that test period.

Since the shot number is taken from disc file SYSCON.DAT, it must be stored there. The procedure to get a past shot file is to run two programs: SHOTNO (to set in the desired shot number) and SAVCON (to store this shot number in the disc file). Since program TABIN updates disc file SYSCON.DAT during its operation, the above procedure is not required during the normal program sequence.

DISTRIBUTION

DEFENSE DOCUMENTATION CENTER
CAMERON STATION, BUILDING 5
ALEXANDRIA, VA 22314
ATTN DDC-TCA (12 COPIES)

COMMANDER
USA RSCH & STD GP (EUR)
BOX 65
FPO NEW YORK 09510
ATTN LTC JAMES M. KENNEDY, JR.
CHIEF, PHYSICS & MATH BRANCH

COMMANDER
US ARMY MATERIEL DEVELOPMENT
& READINESS COMMAND
5001 EISENHOWER AVENUE
ALEXANDRIA, VA 22333
ATTN DRXAM-TL, HQ TECH LIBRARY

COMMANDER
US ARMY ARMAMENT MATERIEL
READINESS COMMAND
ROCK ISLAND ARSENAL
ROCK ISLAND, IL 61201
ATTN DRSAR-ASF, FUZE
& MUNITIONS SPT DIV

COMMANDER
USA MISSILE & MUNITIONS
CENTER & SCHOOL
REDSTONE ARSENAL, AL 35809
ATTN ATSK-CTD-F

DIRECTOR
DEFENSE COMMUNICATIONS AGENCY
DEPT OF DEFENSE
WASHINGTON, DC 20305
ATTN PLANS & PROGRAMS DIRECTORATE
ATTN OFC OF SYS ENGINEERING
ATTN TECH LIBRARY
ATTN NMR

DIRECTOR
DEFENSE NUCLEAR AGENCY
WASHINGTON, DC 20305
ATTN PETER HAAS, DEP DIR,
SCIENTIFIC TECHNOLOGY
ATTN RADIATION DIRECTORATE
ATTN ELECTRONIC VULNERABILITY
DIV (RAEV)
ATTN ANALYSIS & PROGRAMS DIRECTORATE
ATTN TECHNICAL LIBRARY (APTL)
ATTN VULNERABILITY DIRECTORATE
ATTN INFORMATION SYSTEMS DIV (VLIS)
ATTN DDST
ATTN TITL TECH LIBRARY
ATTN TISI ARCHIVES

DIRECTOR OF DEFENSE RESEARCH
& ENGINEERING
WASHINGTON, DC 20301
ATTN DER DIR (TEST & EVALUATION)
ATTN ASST DIR (ENG TECHNOLOGY)

COMMANDER
FIELD COMMAND
DEFENSE NUCLEAR AGENCY
KIRTLAND AFB, NM 87115
ATTN FCSD-A4, TECH REF BR
ATTN D. SHAMBLIN

COMMANDER
AF WEAPONS LAB, AFSC
KIRTLAND AFB, NM 87117
ATTN SE, NUCLEAR SYS DIV
ATTN EL, ELECTRONICS DIV
ATTN ELC, COMM & SATELLITE BR
ATTN LR, LASER DEV DIV
ATTN LRL, LASER DEVICE BR

DIRECTOR
DEFENSE ADVANCED RESEARCH
PROJECT AGENCY
ARCHITECT BUILDING
1400 WILSON BLVD
ARLINGTON, VA 22209
ATTN NMR

CHIEF
LIVERMORE DIVISION FIELD
COMMAND, DNA
LAWRENCE LIVERMORE LABORATORY
P.O. BOX 808
LIVERMORE, CA 94550
ATTN FCPRL

COMMANDER
REDSTONE SCIENTIFIC INFORMATION CTR
US ARMY MISSILE COMMAND
REDSTONE ARSENAL, AL 35809
ATTN CHIEF, DOCUMENTS

CHIEF
US ARMY COMMUNICATIONS SYS AGENCY
FORT MONMOUTH, NJ 07703
ATTN SCCM-AD-SV, LIBRARY

COMMANDER
US ARMY ELECTRONICS COMMAND
FORT MONMOUTH, NJ 07703
ATTN DRSEL

COMMANDER
US ARMY FOREIGN SCIENCE & TECH CTR
220 7TH STREET, NE
CHARLOTTESVILLE, VA 22901
ATTN DRXST-ISI

DISTRIBUTION (Cont'd)

DIRECTOR
NAVAL RESEARCH LABORATORY
WASHINGTON, DC 20375
ATTN CODE 7756, J. DAVIS

COMMANDER
NAVAL SURFACE WEAPONS CENTER
WHITE OAK, SILVER SPRING, MD 20910
ATTN CODE WA501, NAVY NUC PRGMS OFF

AF WEAPONS LABORATORY, AFSC
KIRTLAND AFB, NM 87117
ATTN SUL

AF WEAPONS LABORATORY, AFSC
KIRTLAND AFB, NM 87117
ATTN NTS

AF WEAPONS LABORATORY, AFSC
KIRTLAND AFB, NM 87117
ATTN DYC

COMMANDER
ROME AIR DEVELOPMENT CENTER, AFSC
HANSCOM AFB, MA 01731
ATTN EDWARD A. BURKE

SAMSO/DY
POST OFFICE BOX 92960
WORLDWAY POSTAL CENTER
LOS ANGELES, CA 90009
ATTN DYS (TECHNOLOGY)

SAMSO/MN
NORTON AFB, CA 92409
ATTN MNNG (MINUTEMAN)
ATTN MNNH (MINUTEMAN)

SAMSO/SK
POST OFFICE BOX 92960
WORLDWAY POSTAL CENTER
LOS ANGELES, CA 90009
ATTN SKF (SPACE COMM SYSTEMS)

SAMSO/XR
POST OFFICE BOX 92960
WORLDWAY POSTAL CENTER
LOS ANGELES, CA 90009
ATTN XRS (DEVELOPMENT PLANS)

UNIVERSITY OF CALIFORNIA
LAWRENCE LIVERMORE LABORATORY
P.O. BOX 808
LIVERMORE, CA 94550
ATTN TECH INFO DEPT L-3

NASA
LEWIS RESEARCH CENTER
21000 BROOKPARK ROAD
CLEVELAND, OH 44135
ATTN LIBRARY (NO R/D)

AEROSPACE CORPORATION
P.O. BOX 92957
LOS ANGELES, CA 90009

CALIFORNIA AT SAN DIEGO, UNIVERSITY OF
IPAPS, B-019
LA JOLLA, CA 92093
ATTN SHERMAN DE FOREST

COMPUTER SCIENCES CORPORATION
201 LA VETA DRIVE N.E.
ALBUQUERQUE, NM 87108
ATTN ALVIN T. SCHIFF

DEPLOMB, DR. EUGENE P.
2422 DEER PARK DRIVE
SAN DIEGO, CA 92110
ATTN EUGENE P. DEPLOMB

DIKEWOOD INDUSTRIES, INC
1009 BRADBURY DRIVE, S.E.
ALBUQUERQUE, NM 87106
ATTN TECH LIB

EG&G, INC.
ALBUQUERQUE DIVISION
P.O. BOX 10218
ALBUQUERQUE, NM 87114
ATTN TECHNICAL LIBRARY

FORD AEROSPACE & COMMUNICATIONS CORP
3939 FABIAN WAY
PALO ALTO, CA 94303
ATTN DONALD R. MCMORROW, MS G30

GENERAL ELECTRIC COMPANY
SPACE DIVISION
VALLEY FORGE SPACE CENTER
GODDARD BLVD KING OF PRUSSIA
P.O. BOX 8555
PHILADELPHIA, PA 19101
ATTN JOSEPH C. PEDEN VFSC, RM 4230M

GENERAL ELECTRIC COMPANY
TEMPO-CENTER FOR ADVANCED STUDIES
816 STATE STREET (P.O. DRAWER QQ)
SANTA BARBARA, CA 93102
ATTN DASIAC

HUGHES AIRCRAFT COMPANY
CENTINELA AND TEALE
CULVER CITY, CA 90230
ATTN TECH LIB

IRT CORPORATION
P.O. BOX 81087
SAN DIEGO, CA 92138
ATTN TECHNICAL LIBRARY

DISTRIBUTION (Cont'd)

JAYCOR
1401 CAMINO DEL MAR
DEL MAR, CA 92014
ATTN LIBRARY

KAMAN SCIENCES CORPORATION
P.O. BOX 7463
COLORADO SPRINGS, CO 80933
ATTN LIBRARY

MISSION RESEARCH CORPORATION
735 STATE STREET
SANTA BARBARA, CA 93101
ATTN CONRAD L. LONGMIRE

MISSION RESEARCH CORPORATION-
SAN DIEGO
P.O. BOX 1209
LA JOLLA, CA 92038
ATTN LIBRARY

R & D ASSOCIATES
P.O. BOX 9695
MARINA DEL REY, CA 90291
ATTN TECHNICAL LIBRARY

SCIENCE APPLICATIONS, INCORPORATED
8400 WESTPARK DRIVE
MCLEAN, VA 22101
ATTN WILLIAM L. CHADSEY

SIMULATION PHYSICS, INC.
41 "B" STREET
BURLINGTON, MA 01803
ATTN ROGER G. LITTLE

STANFORD RESEARCH INSTITUTE
333 RAVENSWOOD AVENUE
MENLO PARK, CA 94025
ATTN LIBRARY

SYSTEMS, SCIENCE AND SOFTWARE, INC.
P.O. BOX 1620
LA JOLLA, CA 92038
ATTN TECHNICAL LIBRARY

TRW DEFENSE & SPACE SYS GROUP
ONE SPACE PARK
REDONDO BEACH, CA 90278
ATTN ROBERT M. WEBB, R1-2410

HARRY DIAMOND LABORATORIES
ATTN COMMANDER/
FLYER, I.N./LANDIS, P.E./
SOMMER, H./OSWALD, R. B.
ATTN CARTER, W.W., DR., TECHNICAL
DIRECTOR/MARCUS, S.M.
ATTN WISEMAN, ROBERT S., DR.,
DRDEL-CT
ATTN KIMMEL, S., PAO
ATTN CHIEF, 0021
ATTN CHIEF, 0022
ATTN CHIEF, LAB 200
ATTN CHIEF, LAB 300
ATTN CHIEF, LAB 400
ATTN CHIEF, LAB 500
ATTN CHIEF, LAB 600
ATTN CHIEF, DIV 700
ATTN CHIEF, DIV 800
ATTN CHIEF, LAB 900
ATTN CHIEF, LAB 1000
ATTN RECORD COPY, BR 041
ATTN HDL LIBRARY (5 COPIES)
ATTN CHAIRMAN, EDITORIAL COMMITTEE
ATTN CHIEF, 047
ATTN TECH REPORTS, 013
ATTN PATENT LAW BRANCH, 071
ATTN GIDEP OFFICE, 741
ATTN LANHAM, C., 0021
ATTN ROSADO, J., 210
ATTN BLACKBURN, J., 230
ATTN PUTTCAMP, R., 230 (20 COPIES)
ATTN TOMPKINS, J., 230
ATTN SCHALLHORN, D., 230
ATTN PETTY, W., 1050 (2 COPIES)
ATTN GILBERT, R., 230
ATTN SCOTT, W., 1050
ATTN MATTHEWS, H. J., III, 0025
ATTN CALDWELL, P. A., CHIEF 290
ATTN LAMB, R. C., 290